A Naval Safety Center Publication

# approach

JULY 1970 THE NAVAL AVIATION SAFETY REVIEW

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TECHNOLOGY & SCIENCE

The pilot of a naval aircraft, regardless of rank, experience or position in a flight, has a basic responsibility for the safe operation of his aircraft. This responsibility includes proper preflight preparation and correct inflight operation of his aircraft. When operating independently this responsibility is virtually complete; however, when he is operating as part of a flight of two or more aircraft the potential courses of action which he can take on his own initiative are sharply circumscribed by the authority, direction and *leadership* which the flight leader (as pilot in command) exercises over the conduct of the flight. Therefore, flight leaders must be continuously aware that the authority they exercise carries with it the responsibility to insure that flights are conducted safely – from the preflight briefing to shutdown in the chocks.

# Flight Leadership

FLIGHT leader error was a primary or contributing cause factor in a substantial number of aircraft accidents during the past year. Some of these accidents were caused by flight leaders failing to properly plan or brief their flights. In most cases, however, the flights were ostensibly well planned and well briefed but came to grief when the flight leaders modified the flights as originally briefed and performed actions or maneuvers which were unplanned. Frequently these actions and maneuvers – in addition to being unplanned – were in direct violation of some well known order, regulation or standard operating procedure.

In one recent case, a flight of two A-7 aircraft was returning from a practice bombing flight when the flight leader elected to make an unbriefed, high speed, low altitude pass abeam a foreign freighter which was cruising in the area.

The flight rolled in from about 14,000 feet in free cruise formation and commenced a dive which was estimated by the wingman to be between 30 and 45 degrees. Level off was accomplished at 200 feet and 550 kias. At this time the wingman moved from a free cruise position to a loose parade position. As the flight passed 1000 to 2000 feet abeam the ship, the leader commenced a slow pull up to about a 30-degree nose high attitude. The wingman reduced power in order to slide back into a free cruise position but during this transition the leader commenced an aileron roll to the right which was later described by the wingman as "fairly rapid."

The wingman did not or could not follow the maneuver and closed on the leader. When the aircraft were canopy to canopy, the wingman went to full power, simultaneously pushing the stick full forward and to the left. The two aircraft collided violently and the wingman's aircraft was engulfed in flames. The wingman then ejected, using his alternate firing handle. He suffered only minor injuries and was subsequently rescued by the ship. The flight leader, however, was not recovered even though the wingman had observed a blossomed chute following his

own ejection. After an extended but unsuccessful search, the flight leader was declared missing.

It might be argued that a flight leader cannot brief his wingman on every turn, climb, descent and power change which will take place during a flight and that the wingman should have been able to match the flight leader's maneuver, or at least to have avoided a collision. This argument, however, overlooks the reality that wingmen have limitations in their ability to respond to the actions of the leader. In this case, obviously, the flight leader led the wingman into a situation which exceeded his capabilities.

Conducting a flight in such a manner that the capabilities of other members of the flight are not exceeded is a matter of judgment. With the benefit of hindsight, it is clear that this flight leader made an error in judgment when he departed from the briefed flight plan to make an unauthorized, unbriefed, low altitude run on the ship. He then compounded this error by initiating an aileron roll, without warning, when he was unaware of the exact position of his wingman and did not properly assess the wingman's capability to follow the maneuver.

One of the most tragic and unnecessary accidents during the past year involved inadequate preflight preparation, i.e., failure to obtain an up-to-date weather forecast. In this case a three-plane flight of A-4Cs was enroute to their assigned target area when they encountered low ceilings. As they continued under the lowering clouds, the weather further deteriorated and it became obvious to the flight leader that they could not continue, so he made the decision to return to home base. He notified his two wingmen of this intention and commenced a descending 180 degree left turn from an altitude of about 600 feet. During the turn, while trying to stay beneath the overcast, the leader descended to less than 100 feet AGL. Due to the low visibility, both wingmen were maintaining parade formation in order to avoid losing sight of the leader. At some point in the turn the lead aircraft flew into the tops of some trees but recovered without serious damage; *however,* both wingmen crashed into the trees/ground and were fatally injured.

As already noted, the flight leader failed to obtain an up-to-date weather forecast for the flight. He considered his personal estimate of the weather to be sufficient and satisfactory, as he had observed it during a previous flight which had terminated 30 minutes prior to the subject briefing. If the flight leader had obtained a weather forecast prior to the flight it is possible that the flight would have been delayed or canceled and, thus, the accident might have been prevented. However, failure to obtain a weather forecast does not appear to be the basic cause of this

accident. Rather, it appears to have resulted from errors in judgment by the flight leader after the flight took off. He violated one of the oldest and best known maxims in naval aviation, i.e., don't proceed VFR when it's not. Considering that the flight took off in VFR conditions, there was a point in the flight where the flight leader had the option of remaining in VFR conditions. Instead of availing himself of this option he chose to continue the flight into conditions which were below minimums for VFR flight until finally it became clear that he could proceed no further. At this point he overlooked another opportunity to escape from the situation safely, i.e., a climb to VFR conditions on top of the cloud layer, which was relatively thin. Even if the flight leader decided that his wingmen could not hack an IFR formation climb to on top, it would have been a relatively simple matter to have assigned each aircraft a separate heading for individual climbs to on top.

Another accident with many similarities to the one just recounted occurred in an overseas operating area. In this case, too, the flight leader led the flight into low visibility flight conditions under low clouds. He then attempted a 180-degree turn under the clouds in mountainous terrain but the two wingmen recognized the extreme hazard involved in this maneuver and pulled up through the overcast. Here's how it happened:

A flight of three aircraft (two A-4Cs and an F-4B) launched from an aircraft carrier to fly a strike profile and make a simulated attack on an abandoned airfield, as part of an international exercise.

The three aircraft climbed to high altitude after a normal VFR launch and rendezvous. The flight leader planned to conduct the first portion of the flight at attitude and upon passing an enroute check point descend to low altitude for the remainder of the flight.

The flight descended to about 2,000 feet after passing the check point and made a turn to line up with a railroad track which defined the flight path for the remaining 80 miles of the route to the target.

The weather was good during the high level portion of the flight and first part of the low level portion. As the flight proceeded along the railroad track, the leader (in an A-4C) and the wingman in the other A-4C descended to below 100 feet AGL while the F-4B flew a

trail position at 500-1000 feet AGL. The flight soon approached an area of rising terrain where the elevation of the railroad increased from 600 feet MSL to 2800 feet MSL within a distance of 15 miles. At this time the flight climbed to 400-500 feet AGL and the second A-4C took up a position at 5 o'clock about 1000 feet behind the leader. The F-4B was still in a trail position behind the two A-4Cs.

They soon approached a deck of low clouds which covered a limited area along the route. Visibility decreased somewhat but the flight leader elected to continue into the haze and go under the deck of clouds rather than pull up and go over them. At this point the visibility decreased very rapidly and the flight leader commenced a hard left turn and transmitted that he was doing a 180. As the leader started the turn, the wingman in the second A-4C started to lose sight of both the leader and the terrain. He then leveled his wings and pulled up straight ahead in a steep climb. The pilot of the F-4B likewise zoom-climbed to on top. Both of the wingmen were on top in a matter of seconds. Shortly thereafter they spotted a column of black smoke rising through the overcast. Subsequent investigation revealed that the leader had impacted against the side of a ridge between 2000 and 2500 feet MSL. The pilot received fatal injuries as a result of the crash.

Other recent accidents in which flight leaders failed in their responsibility to lead their flights in a safe and orderly manner include these:



• Two A-4Es departed on a cross-country training flight. During the brief, the flight leader mentioned to the wingman specifically that they would not engage in any air combat maneuvering because they were carrying squadron mail in the aircraft and a possibility existed (although considered remote) that the bags might come out of their stowage areas during violent maneuvering. Nevertheless, during the course of the flight another aircraft (an A-7) made an inviting pass on the flight and the flight leader changed his mind on the spur of the moment and engaged in unbriefed air combat maneuvering without the benefit of any radio communication with the other aircraft. The result was a midair collision between the flight leader and opposing aircraft. The flight leader was fatally injured.

• Two A-4Cs took off on a scheduled practice bombing flight to a distant target, to be combined with practice road reconnaissance. Both pilots had recently returned from a combat tour where they had frequently flown together and both had nearly equal experience. The preflight brief was very sketchy and neither pilot bothered to plot the route of the flight on a chart. Shortly after takeoff the flight deviated from the planned route and made a low level pass over a dam and reservoir located in a resort area. The flight leader descended to about 20 feet AGL over the reservoir and as he commenced a pull-up near the end of the reservoir, his aircraft struck and severed a set of power lines. The aircraft received substantial damage but successfully landed at home field.

• A flight instructor and his student took off in two TAF-9Js on a scheduled tactics flight. Fifteen thousand feet was set as the floor for practice maneuvering in accordance with Training Command instructions; however, during the course of the ensuing engagement, the instructor allowed the maneuvering to continue well below 15,000 feet. The result was that the student inadvertently flew into an undercast, lost control of his aircraft and broke out of the bottom of the clouds at about 3000 feet in a steep nose down attitude. Realizing the extreme situation he was in, he successfully ejected from the aircraft.

These accidents emphasize that designation as a flight leader carries with it a great responsibility. This responsibility arises because the flight leader has been given authority to exercise control and direction over the employment and conduct of other members of the flight. Therefore, the designation reasonably carries with it the understanding that the flight leader possesses the requisite skills, knowledge and judgment as well as flight experience and that he is intimately familiar with all procedures, aircraft systems and doctrines necessary for the safe completion of each flight undertaken.

Flight leaders must be continuously aware of these responsibilities. They must insure that flights are carefully planned and briefed and that they are conducted with due consideration of the capabilities of each member of the flight. Deviations from the flight as planned should be kept to a minimum and it goes without saying that flight rules, regulations and standard operating procedures must not be violated.

Each member of a flight has a right to expect that his flight leader is knowledgeable and experienced, that he will lead the flight properly – go to the right place and do the right thing – and that he will be alert at all times to the necessity for making timely and correct decisions in order to insure the safety of the flight. ◄

Regardless of who is at fault everyone loses in a midair.
Ace L.

# A-M-A-Z-I-N-G

HAVE you ever jumped to a conclusion while trying to perform a logical troubleshooting or testing sequence? Here is an account of a scientific test which, it has been rumored, occurred at an east coast naval facility.

Test No. 1

Preparation: Removed the front two legs from grasshopper and placed it on a table top.

Test: Gave the verbal command: Crawl.

Result: Grasshopper crawled.

Test No. 2

Preparation: Removed second set of front legs from same grasshopper and replaced it on table top.

Test: Gave the verbal command: Crawl.

Result: Grasshopper crawled.

Test No. 3

Preparation: Removed the back legs from same grasshopper, leaving it no legs and replaced grasshopper on table top.

Test: Gave the verbal command: Crawl.

Result: Grasshopper did not crawl.

CONCLUSION: It has been determined beyond all doubt by a series of tests using exacting scientific methods that a grasshopper, with all its legs removed . . . can no longer hear!

*KAMAN Rotor Tips*

*Are your troubleshooting methods sound?*

# 'Anatomy of an Accident'

By LCDR A. E. Pellerin
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AN ELOQUENT author would have called the night blustery; helicopter pilots would have referred to it as hairy. A sea state of five caused the carrier deck to pitch and roll as the OOD ordered many changes of course to minimize deck motion and provide acceptable winds for the ASW launch. To make matters more difficult there was no horizon and the carrier was encountering intermittent rain showers.

As launch time approached the air boss asked the pilot of the first helicopter if winds from 330 to 340 degrees relative at 30 knots were acceptable for launch. The pilot asked if the ship could provide winds closer to the angle-deck centerline. The answer was negative, a change of course would cause too much roll. Within a short period of time the first helicopter then launched and departed on its assigned kilo radial. The second helicopter was given the launch signal, lifted into a hover, slid left, turned port approximately 25 degrees and made a transition to forward flight at 80 to 100 feet above the water. As this helicopter took up an outbound heading, it assumed a nose-low descending attitude until it struck the water. After initial impact with the water, the helo bounced once, impacted again and sank immediately. The copilot (aircraft commander), who had been busy raising the landing gear and turning on the rotating beacons, was unaware of any problems until he heard the pilot call for ASE (Automatic Stabilization Equipment). The copilot looked at the ASE control panel and saw the ASE engaged light on, indicating that the ASE was engaged. He pushed the switch to make sure it was engaged and then noticed the helicopter's descent and nose-down attitude. The helo hit the water

before the copilot could reach the controls. As the helo sank, the copilot released his lap belt and shoulder harnesses and exited via the port cockpit window. The pilot and two crewmen were lost.

A number of ideas come to mind when trying to unravel the assortment of possibilities that could have caused this mishap. The end result of the accident board's deliberations and subsequent endorsers' evaluations was that no single sure-fire explanation exists, yet several interesting facts and circumstances provide us with some possibilities and lessons to be learned. Some obvious areas require exploring to determine what part they played in the accident; possible ASE failure, pilot technique, cockpit coordination and pilot disorientation.

ASE failure could certainly have caused the pilot to lose control of the aircraft; however, the copilot stated that no unusual jumps, kicks, yawing or power fluctuations were noticed. All information indicates that the helicopter flew smoothly in a level attitude into the water. The maintenance record of this aircraft gave no clues – there had been no history of ASE difficulties. ASE failure during this phase of flight would certainly be a problem, but one that could be overcome, particularly if it were a single channel failure. Now let's consider pilot technique. Anytime a takeoff is made, day or night (especially at night when there is no horizon), the first, main and only requirement of the pilot is to establish a positive climb and an airspeed to sustain that climb. Everything else can wait – *everything else must wait*. If your departure instructions include a turn, you do so after, and only after, you're climbing out and cleaned up. For helicopters this might be as low as 300 feet while fixed-wing pilots may prefer to wait until reaching a higher altitude. There is a definite tie-in between the pilot's performance in this accident and his capabilities which will be discussed later.

Another area worth considering is cockpit coordination. If a generalization may be made it is this: When a plane commander moves into the copilot's seat to permit a lesser experienced person to make a takeoff or landing, cockpit coordination usually deteriorates. Why? Each pilot becomes used to certain duties automatically, with or without a cockpit briefing, for the seat which he normally occupies. When seats are exchanged, each pilot must be mentally prepared to do different things in a different sequence. A cockpit briefing is always important but is even more vital when seats are exchanged. In this accident the requirement of the aircraft commander acting as copilot to monitor the gages while performing other cockpit duties was apparently not fulfilled.

The last distinct possibility, that of pilot disorientation, covers a lot of territory. The difficulty of flying helicopters at night over water is well documented by the number of helicopter "collision with water" type accidents. The unusual departure made by this helicopter may have compounded the pilot's orientation problems. Because fixed-wing aircraft were spotted on the forward end of the angle-deck, the pilot slid sideways, yawed the helo around to port and started his departure. A violation of NATOPS? You bet! But what is more important is that this creates all sorts of difficulties for the pilot when he tries to make a transition from visual reference on the ship to full instrument flight. It appears that the pilot in this case never established a climb after departing the ship because of poor transition to his instrument scan. The correct departure would have included a clear angle-deck, a takeoff path down the angle-deck and a climb to 300 feet before turning to assigned departure radial, thus reducing the difficulty of the evolution.

Launch winds given to the first helo's pilot were outside prescribed limits but, as indicated from reconstruction of events leading up to the accident, were the best winds available considering existing conditions. Since both helicopters successfully launched and cleared the ship, the launch winds could only be considered as adverse but not a contributing cause factor.

One additional area that cannot be overlooked is that of pilot skills. The pilot of the lost helo had a below-average record throughout the Naval Air Training Command and CRAG (Combat Replacement Air Group). The operational squadron's records clearly indicated that he had difficulty keeping up with the aircraft. One wonders if the aircraft commander knew of this weakness. The picture this accident presents is one of a weak pilot executing a black-night carrier launch under arduous circumstances with inadequate supervision.

With the advantage of hindsight let's reconstruct some objective, common-sense ideas to keep this type accident from happening again.

- Practice simulated instrument takeoffs frequently – and it isn't necessary to cover windshields, wear special shields or hoods for this practice.
- Conduct cockpit briefs prior to every hop. The pilot in the aircraft commander's seat should do the briefing.
- Practice simulated instrument flight frequently to develop a good instrument scan.
- Condition yourself to go fully on the gages from visual flight by repeated practice.
- Request CCAs and GCAs at every opportunity.
- Conduct regular ASE-off takeoffs.
- (Add as many more preventatives as you can!)

# Short Snorts

## Oxygen Mask Deviation

TWO F-8 pilots had completed a photo mission and were returning to the ship at FL 300. Because of the flight leader's communications difficulty with Marshall Control, the wingman took over as leader of the section. A standard NATOPS lead change signal was given and acknowledged by the original leader (the photo F-8).



Enroute descent was commenced to rendezvous with a tanker aircraft. The leader's attention was directed solely to visually acquiring the tanker and effecting a joinup. At the time of joinup the tanker crew observed only one F-8. Despite all efforts to communicate with the missing F-8 nothing further was heard or seen of the aircraft. All SAR efforts failed to provide a single clue as to the whereabouts of the missing photo pilot.

After the flight had launched, the photo escort pilot noted that the leader was not wearing his oxygen mask. This enroute transit to the target area took about 20 minutes at FL 300.

In the investigation of the accident it was noted that the photo aircraft had a known pressurization discrepancy which caused the cockpit pressure altitude to increase with decreases in power. With a sufficient reduction of power, the cockpit pressure altitude would have increased to above 15,000 feet. After the lead change, with reduced power used during descent, the cockpit pressure altitude would have increased in the missing aircraft. This fact, coupled with the possibility that the pilot had his mask off at the time, indicates hypoxia as a speculative cause of this accident.

Not wearing the oxygen mask at all times from takeoff to landing in a pressurized combat or combat training jet aircraft is a deviation from NATOPS and a violation of OpNavInst 3710.7D. Although the cause of this accident must of necessity be undetermined, it is highly probable that the pilot's failure to wear his mask at all times, coupled with the known cockpit pressurization discrepancy, combined to produce a situation which physically incapacitated the pilot.

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Subscription rates: Single copy, 75 cents; 1-year (4 issues) $3.00.

## Shove Off Cox'un

WHEN the last P-5M was retired from service, signifying the end of the P-boat era, few people in aviation thought much any more about aircraft seamanship. The skills that *Marlin, Catalina* and *Coronado* pilots of WW II vintage developed in sailing those big boats up to buoys and ramps was forgotten. However, a few months ago a little nostalgia was experienced in certain quarters when the pilot of an RH-3A had to resort to some aircraft seamanship to save his helicopter.

The helicopter involved in this incident had been out on a banner-towing exercise. A loud whining noise was heard by the pilots and crew while towing but the instruments revealed nothing unusual. Less than a minute later there was a loud BANG followed by power loss on one engine. The pilot, who was flying at about 60 feet altitude and 20 knots, added full power on the good engine just in time to make a nice, soft water landing. The tow was released and after watertight integrity was confirmed he tried six unsuccessful attempts to make single-engine takeoffs. Winds were light and the sea was not rough – waves of only one to two feet. The pilot then began water taxiing at about 10 knots to a ramp which was in a protected area in a harbor four miles away. He carefully kept the red buoys on his right while entering the channel, allowed for a little drift as he taxied crosswind, gave himself plenty of room to turn downwind for his run to the ramp,

lowered his gear and taxied up the ramp to a parking spot. All in a day's work. One wonders if he logged the 2.3 hours on the water as flight time?

Investigation of the failed engine revealed that the engine drive shaft and input coupling failed.

### Crash On The Field

"HEY, TOWER, there's a plane overturned on the flight line!" When the tower received this message the crash alarm was sounded and the crash truck dispatched to the scene. The aircraft, one of Bell's finest, was scheduled for a ground turnup to adjust RPM – reset the low RPM warning light and the audio for low RPM. The pilot had well over a thousand hours in helicopters and had almost completed the maintenance test pilot training syllabus in type. He had thoroughly preflighted the aircraft. Approximately five minutes after turnup, the aircraft yawed, in the chocks, about 10 degrees left, stopped, yawed another 20 degrees left, then rapidly spun in a level attitude until it completed two revolutions. After this, and in rather quick order, the helicopter took off, the nose pitched up an estimated 30 degrees and simultaneously rolled into a right, 60-degree bank until the main rotor blades struck the ground and the aircraft crashed on its right side.

In order to accomplish the maintenance work order, a designated aviation electrician striker had accompanied the pilot to the aircraft. After the plane had been started, the AEAN, who was standing on the ground, leaned into the cockpit to make the necessary adjustments. His body inadvertently depressed the rudder pedal and the pilot was unable to counter with right rudder. The AEAN spun with the aircraft – the upper half of his torso was inside the plane and his feet and legs were outside of the helicopter – until he was thrown out when the main rotor blades contacted the ground. Fortunately, neither he nor the pilot received any injuries.

This posed photo illustrates the position of electrician adjusting RPM warning light control box.

This unposed photo illustrates the final position of one of Bell's finest.

The accident board deduced that the reason the helicopter became airborne was that the pilot, who was not strapped in, was so affected by centrifugal force generated by the ground spin that he applied UP collective and right, aft cyclic. This accounted for the pitch up and right roll.

To prevent any similar occurrence the command has instituted a procedure using an adapter cable which allows adjustment of the RPM control without interfering with the pilot's control of the aircraft. The actions of the pilot in manning the cockpit without hardhat and turning up without strapping in were violations of good safety practices. *Anytime* rotors are to be engaged all crewmen should be completely attired in the proper flight gear with seat belts and shoulder harnesses fastened. You never know . . .

# FOG

## Elimination by Man

LAX S XOF 152/68/68 2612/996. Surface transportation is slow. Automobile traffic on the freeways is almost hopelessly snarled. Railroads are running at reduced speed and even pedestrians cross streets more cautiously for fear of unseen traffic. An inconvenience yes, but each traveler expects to reach his destination eventually.

Air traffic has stopped. At the international airport 63 jet transports wait idly while travelers, now numbering in the thousands, overflow the facilities of the terminal buildings and mill about impatiently hoping for boarding instructions from the loudspeakers.



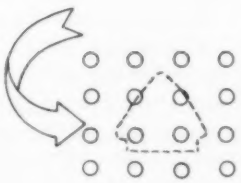
A few miles to the south at a Naval Air Station the crews of four all-weather attack bombers, a patrol bomber and a transport divide their time between watching the incoming sequence reports in the meteorology office and walking to the snack bar for more cups of coffee. The multi-billion dollar aviation machine has been completely put out of action by a saturated condition of the atmosphere called *fog*.

In recent years quantum jumps have been made in the technology of instrument flight. A severe convective weather area is virtually the only environmental roadblock to a well-equipped aircraft enroute. Terminal operations, however, are something else. The aviator is still required to see the runway to safely land or take off and when that small amount of visibility known as "published minimums" is eliminated because of fog, all operations cease.

Three differing approaches have been taken toward alleviation of the fog problem. The oldest and most common is the weather forecast. If the time of onset and duration of fog can be predicted, operations can be scheduled in such a way as to minimize difficulties. This approach has been helpful and may be economically sound, but it offers little solace to the passenger whose business requires him to depart Podunk Municipal at 0635 to arrive at Muddywater International at 1210 or the operations officer who has to support a fleet exercise scheduled to commence at 0900 this morning.

The second route around the fog problem is the "zero-zero" landing system. Such systems have been developed and are operational on a small scale both on land and at sea, but it will be years before these systems are established in general use. Even then they will still suffer from some operational and economic disadvantages.

The third method, and the subject of this article, is to eliminate fog by man-made means.



FOG DROPLETS ARE RESTRICTING THE VISIBILITY.

By E. H. Hinoman
Navy Weather Research Facility
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Fog is an aggregate of small water or ice particles suspended in the air which reduces visibility to less than one kilometer (0.62 miles). It usually forms in a stable air mass when the air becomes saturated. This happens when the air is cooled to saturation as in radiation or advection fog, or sufficient moisture is added to the air to cause condensation – the case in frontal fogs, steam fogs and many ice fogs.

To dissipate fog, one of the generating processes must be reversed, although not necessarily that one which produced the fog. That is, raise the temperature, mix in dryer air or remove the water by some sweeping process.

The first artificial fog dissipation technique was developed in the United States in the mid 1930's. An array of pipes was rigged to spray brine into the fog from the upwind end of a runway. Sprayed brine acts on fog in two ways as illustrated in Fig. 1; the salt has a strong affinity for moisture (it is hygroscopic) and the brine droplets grow at the expense of the small fog droplets. The large and growing salty drops fall out, sweeping out fog droplets as they go. Although not all of the fog droplets were cleared in this early experiment, the percentage removed was sufficient in raising the runway visibility to above operating minimums. The system worked, although the small number of commercial operations could not economically support it.

During World War II a system called "FIDO" (Fog; Intensive Dispersal of) was used in Great Britain to clear runways for returning bombers. Drums of gasoline placed alongside runways were ignited. The heat produced not only lowered the relative humidity but also created local air currents which mixed dry air from aloft, thus clearing the runways for operations. FIDO worked as a wartime emergency measure but when tried at Los Angeles during the post war period was found unacceptable for obvious safety reasons and explainable anxiety among passengers.

Both systems have their modern counterpart. The Navy Weather Research Facility at Norfolk, Virginia is using computer simulation to determine the proper size and density of salt particles and brine spray to disperse fog under various conditions. Operational evaluation of the system is being conducted at Arcata, California by the Naval Weapons Center, China Lake, California and to date shows promising results (Fig. 2). A few years of testing are still required before the system will be ready for fleet usage.

Continued



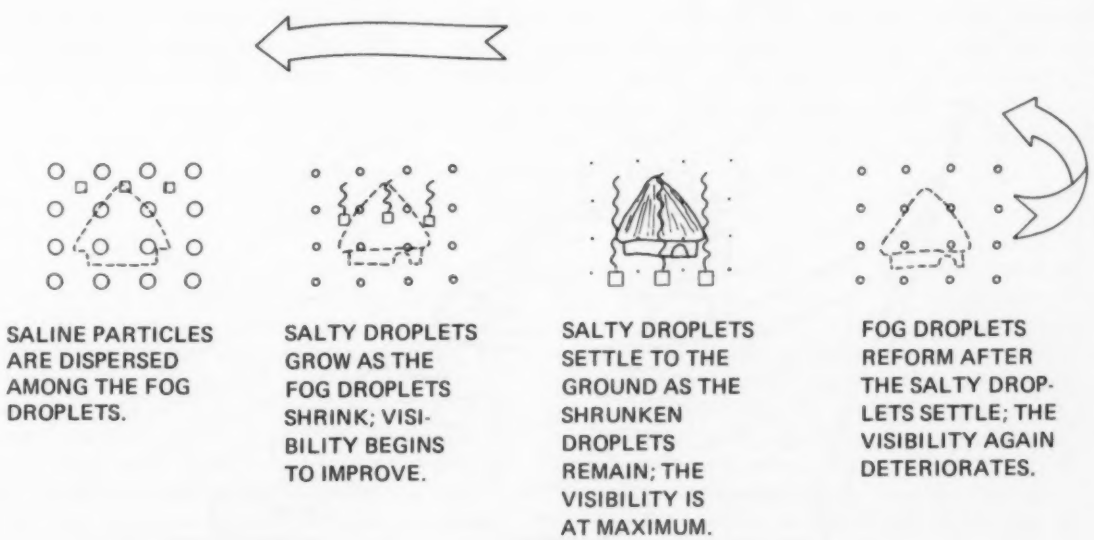
SALINE PARTICLES ARE DISPERSED AMONG THE FOG DROPLETS.
SALTY DROPLETS GROW AS THE FOG DROPLETS SHRINK; VISIBILITY BEGINS TO IMPROVE.
SALTY DROPLETS SETTLE TO THE GROUND AS THE SHRUNKEN DROPLETS REMAIN; THE VISIBILITY IS AT MAXIMUM.
FOG DROPLETS REFORM AFTER THE SALTY DROPLETS SETTLE; THE VISIBILITY AGAIN DETERIORATES.

Figure 1. Salt crystals or brine droplets can improve visibility in fogs warmer than freezing, as graphically illustrated above.

Figure 2. 0800 9 Nov 68 During first seeding
XOF

0836 During second seeding. Fog beginning to clear.
X1/4F

The burning drum of gasoline has been replaced by the jet engine. Jet aircraft placed along the perimeter of a runway with their engines exhausting inboard have successfully raised runway visibility enough to permit recovery of aircraft. Scientists of the Weather Research Facility have determined that the approach corridor to an aircraft carrier could be cleared sufficiently to permit operations with the exhaust heat of 10 A-6 or 20 A-4 aircraft tied down on the deck edge exhausting outboard; however, the turbulence and smoke that are created may negate the fog-clearing effect.

One relatively new technique is fog dissipation by the rotor wash of a large helicopter. The "wake" of a helo flying just above a shallow fog mixes dry air from aloft causing the fog droplets to shrink by evaporation as depicted in Fig. 3. Several passes may be required over



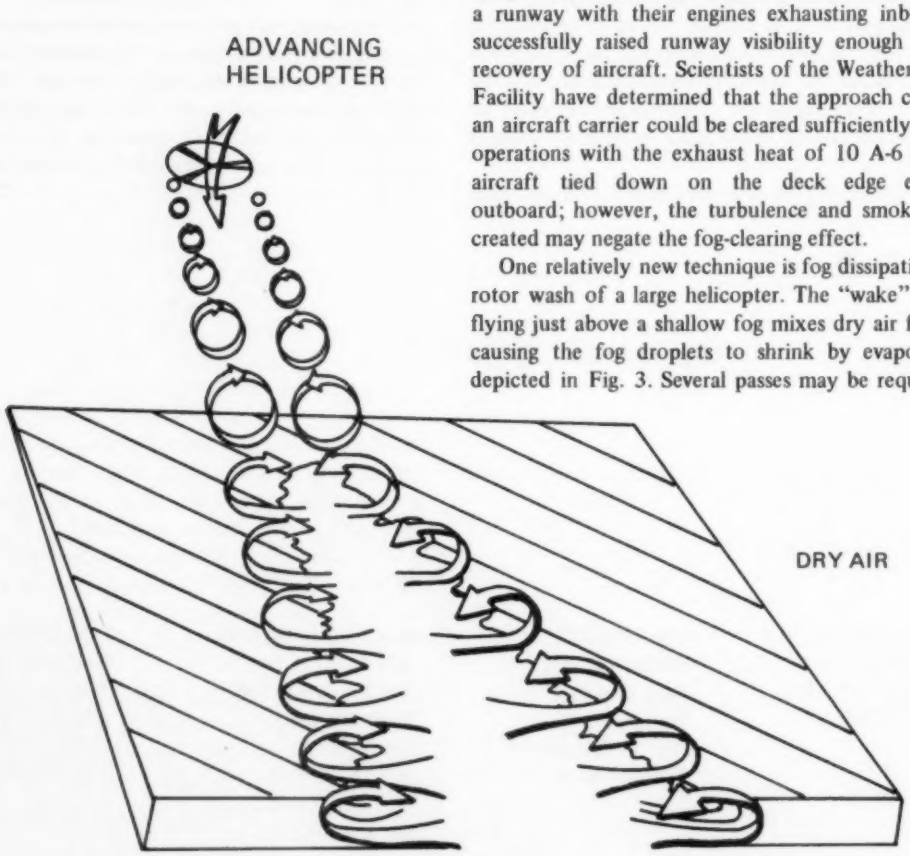


Figure 3. The wake from an advancing helicopter can clear holes in shallow fogs.

0852 Maximum improved visibility.
-XM31F

1000 Fog reforms as seeding effect diminishes.
X1/8F

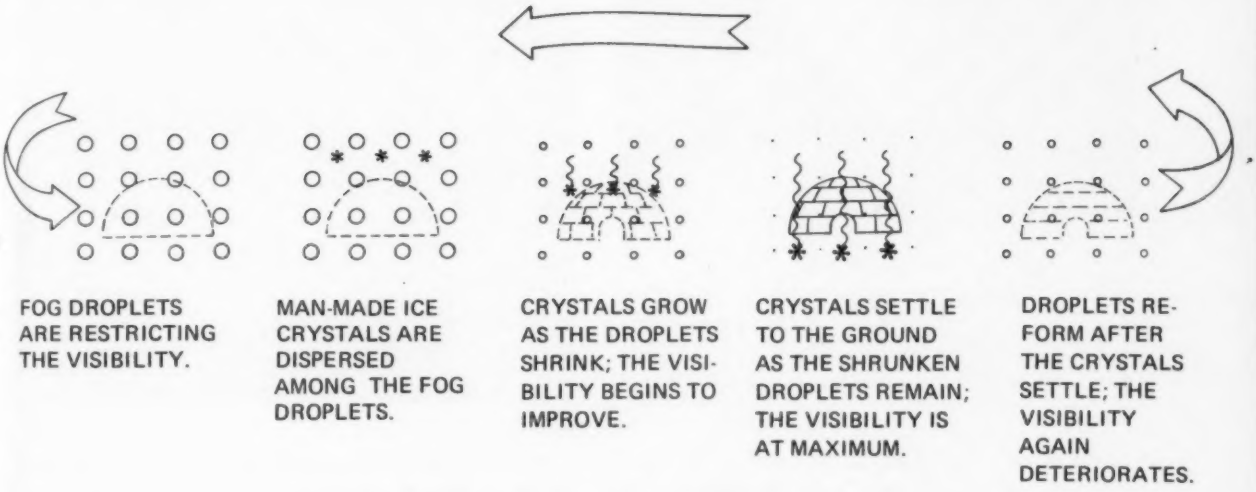
FOG DROPLETS ARE RESTRICTING THE VISIBILITY.
MAN-MADE ICE CRYSTALS ARE DISPERSED AMONG THE FOG DROPLETS.
CRYSTALS GROW AS THE DROPLETS SHRINK; THE VISIBILITY BEGINS TO IMPROVE.
CRYSTALS SETTLE TO THE GROUND AS THE SHRUNKEN DROPLETS REMAIN; THE VISIBILITY IS AT MAXIMUM.
DROPLETS REFORM AFTER THE CRYSTALS SETTLE; THE VISIBILITY AGAIN DETERIORATES.

Figure 4. Ice crystals can improve visibility in fogs colder than freezing.

an area, depending upon the thickness of the fog. Like all fog dispersal methods, the cleared area will remain clear only as long as the modification techniques are applied. Once the dissipating element is removed, fog will reform. There are presently two reported cases of a rescue helicopter in SEAsia orbiting over a downed airman's position and clearing an area of fog sufficiently large to make visual contact with the survivor possible and thus to effect rescue. This technique may soon be considered a standard operating procedure in combat areas.

Probably the most successful fog clearing techniques are those used with sub-freezing or "cold fogs." Any aviator who has encountered icing realizes that small water droplets can remain in the liquid state at temperatures far below $0^0$C. In fact the smallest droplets will not all freeze until the temperature reaches $-40^0$C. Undisturbed, supercooled droplets will persist for a long period of time, but due to an unusual property of water, if a number of ice crystals are introduced, the droplets will evaporate and transfer their moisture to the ice crystals. The ice crystals rapidly grow large enough to fall out, sweeping other ice crystals and water droplets as they go and thus clearing the area beneath the seeding (Fig. 4).

The oldest cold fog clearing technique is to seed fog

Fog is found in all the varied environs of naval operations.

with dry ice pellets. The dry ice "superchills" the water droplets causing ice crystals to form, triggering the clearing process. For the past two winters cold fogs were sufficiently cleared with dry ice pellets at Elmendorf Air Force Base in Alaska to permit operations after 80 percent of the seeding missions. Commercial cold fog dissipation operations in the western U.S. report a similar 80 percent success level; a rather impressive example of recovered operational effectiveness.

The Naval Weapons Center has developed an airborne pyrotechnic device which has been successfully used to clear cold fogs. Pyrotechnic cannisters carried by aircraft are burned, releasing a large number of microscopic silver iodide particles. The silver iodide particles act effectively as ice generating nuclei. Thus, the basic principle is similar to dry ice seeding with one big advantage, the silver iodide cannisters may be stored in readiness for immediate use.

As the state of the art improves, fog dispersal will become as routine as plowing snow. Cold fog dispersal systems are being operationally employed now and the techniques are constantly being improved. The present impetus on both research and experimentation should yield operational methods of clearing warm fogs in the near future.

Routine fog clearing operations will eventually have a much wider application than assisting aircraft launches and recoveries. Harbor channels will be cleared for shipping, major highway routes cleared to speed the flow of traffic and fog clearing will have numerous military applications where visibility becomes a critical factor for successful or safe operations. Furthermore, the principles upon which fog clearing techniques are based will become the foundation from which other more complex weather modification capabilities of the future will develop. ◄

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Only the correct analysis and proper action by the pilot can save the crew when

# Tail Rotor Control Is Lost

ONE EVENT in every helicopter pilot's career that is sure to cause instant dry mouth (referred to as cottonus oralitis) and a full surge of adrenalin is that moment when he realizes he is losing or has lost tail rotor authority. There's only one place to go and that is down – with varying degrees of controllability, depending on the skill of the pilot. Obviously the first procedure is to unload the rotors (to negate the torque) and attempt to maintain some semblance of control by streamlining the helicopter. Consequences of tail rotor control failure usually vary to a great degree but almost always require the very best in pilot skills. In most helicopters right yaw is symptomatic with loss of rudder authority. The yaw can only be lessened by immediate reduction in power and entry into autorotation. Otherwise you are sitting up there in a cockpit that turns rapidly into a centrifuge.

### Case History

"Mayday, Mayday, Mayday. This is Helo 16, Helo 16, Helo 16. Inbound on the 160 degree radial of Oceanside, 4 miles. Ditching." This was the emergency transmission sent by the copilot of an H-1 on tower frequency. The two pilots were on an instrument training hop. The copilot had been flying the aircraft (hooded) when he felt a high frequency vibration in the rudder pedals. The instructor pilot quickly took control and said to his copilot, "I've got it. We've lost the tail rotor. Make a Mayday call." The pilot put in full rudder without any aircraft response and lowered the collective to try to stop the right yaw. He was successful in that the yaw stopped and he tried to bank left to take the shortest route to the beach from out over the ocean. The aircraft had been at 2500 feet indicating 80 knots when the emergency occurred. By the time the pilot had the helicopter pointed as best he could at the shoreline it had descended below 1000 feet and rotor RPM had slowed down a bit. The pilot rolled on some throttle and raised the collective slightly. As he did this the aircraft yawed right and spun rapidly 360 degrees to the right. The pilot reentered a full autorotation, stopping the spin and lessening the yaw and at about 200 feet above the water he ordered the crew to jettison the doors. His door stayed on despite pulling the emergency handle although the copilot and crew chief were successful in releasing their doors. At about 75 feet the pilot initiated a flare and pushed his door off. The helicopter entered the water fairly level but rolled left almost immediately and sank within 15 seconds. Everyone in the helicopter evacuated successfully although two crewmen had to abandon their life vests when the jackets caught on parts of the airframe. Thanks to their timely Mayday calls, two aircraft were on the scene in about two minutes. Several eyewitnesses on the beach saw the crash, one of whom dispatched a Harbor Patrol boat to the rescue.

### Classic Indications

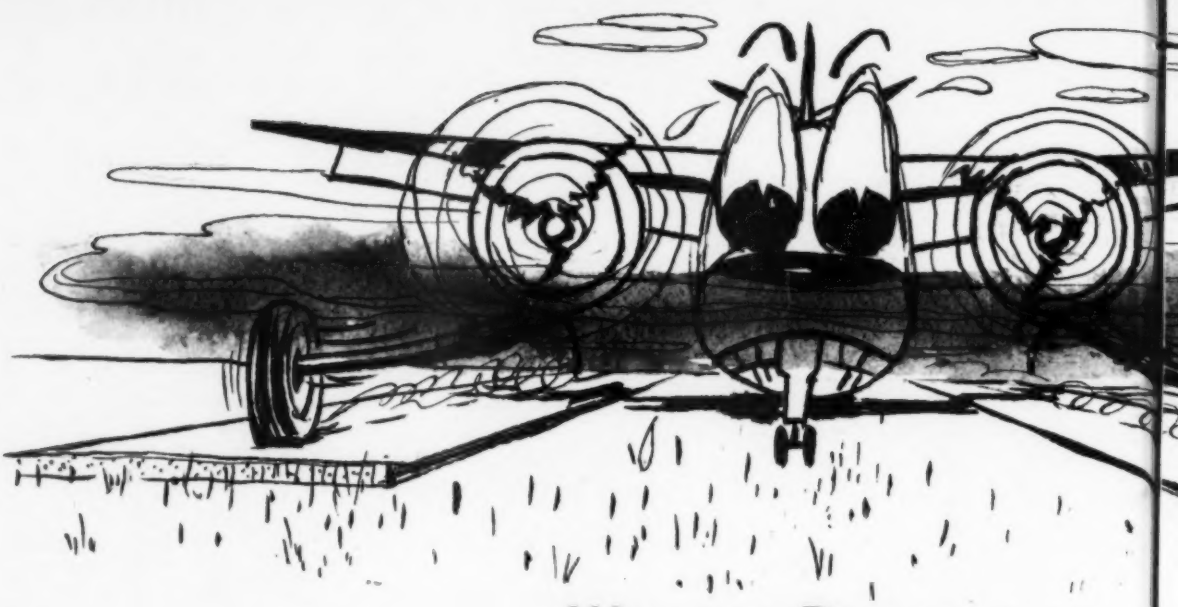
Although this flight crew had their hands full there were several "by-the-book" indications of the tail rotor failure. The ball in the turn-and-bank indicator went full left with the initial yaw; the high frequency vibration was felt first in the rudder pedals and then in the airframe; absence of any rudder response was noted and continuing uncomfortable right yaw and slight tuck under of the nose was experienced.

### Investigation

The wreckage was found in 35 feet of water approximately 72 hours after the crash, and salvage operations successfully recovered the helicopter. The tail rotor blades were intact and displayed no apparent damage from impact (indicative that the blades were not turning at water entry). Rotation of the drive shaft, however, could not be transmitted through the 42 degree gearbox. Further investigation revealed a material failure of the splines on the female part of the 42 degree gearbox input coupling – apparently due to lack of lubrication. Maintenance and servicing were suspected as contributing factors in the mishap. With the present MRCs an inspection and servicing is required every 600 hours on seven couplings in the tail rotor drive shaft system. Individual records for each coupling or component do not exist and consequently it is possible that the failed component (PN 204-040-604-5) never received proper servicing.

In order to preclude this type failure from recurring the squadron incorporated into the MRC deck an inspection and lubrication of this part upon installation and every ODD calendar inspection thereafter. The MIM now requires servicing of newly installed couplings or components.

The action taken by the two pilots in coping with the emergency was exemplary. The cockpit coordination was the type desired but too frequently absent. The IP took positive control, flew the aircraft, barked out what he wanted the others in the crew to do, stayed ahead of the helicopter all the way and successfully ditched with what little control he had available. ◄



# Wrong Runway

A TS-2A departed NAS Blank recently on an IFR round-robin instrument check flight with a student in the left seat and an instructor in the right seat. Total pilot time: Student – not much; instructor – over 4000 hours, mostly in S-2/C-1 aircraft. Weather throughout the area was from bad to very bad and Navy Blank was 400 and 1 and expected to remain that way for a while. Other fields in the area ranged from WOXOF on the coast to about 600/2 further inland. Clouds were layered to well above any altitude an S-2 could reach. The flight proceeded uneventfully to the first check point where a practice VOR approach was commenced. This field reported WOXOF but no landing was intended so the approach was continued. The student was in the soup for the first time in his short career and was understandably somewhat erratic.

After a rather colorful approach to minimums without even a glimpse of the ground, much less the runway, and a missed approach, the instructor decided it wasn't really such a good day to fly after all and requested clearance back to Navy Blank with a GCA pickup for a full stop landing. Clearance was granted as requested. Weather at Navy Blank was now variable from 200/1 to 200/2, duty runway 31 left, which is 8000 feet long. The student was still having trouble with his basic instruments.

Two GCAs were attempted with the student flying but were waved off because he drifted off the controller's scope. At this point the instructor took over and made the next approach. This approach proceeded normally to about one mile at which point the controller reported "on course, on glide slope," three times in succession . . . then reported, "You are *left of centerline,* wave off if field is not in sight."

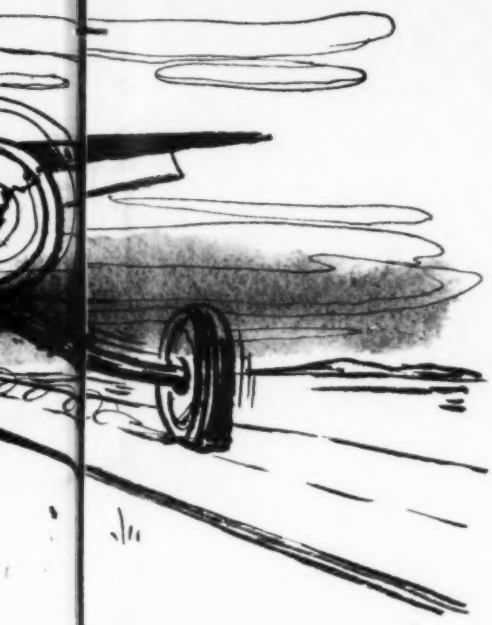
A waveoff was initiated but, as power was being applied, a lighted runway was sighted just off the wingtip to the right. The instructor retarded throttles, called field in sight and stated his intention to land. At the same time, he made an S-turn for lineup and put the aircraft down near centerline about 2500 feet from the approach end of the runway. This still should have left 5500 feet of runway for the



ANYMOUSE

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

**— REPORT AN INCIDENT, PREVENT AN ACCIDENT —**



rollout. No sweat for an S-2.

*However,* after firmly planting the aircraft on the runway and raising the nose for maximum aerodynamic braking, the pilot saw the bitter end of the runway coming up in a hurry from out of the goo. Heavy braking was initiated immediately and, with a generous amount of luck, the aircraft came to a stop before running out of concrete.

After getting calmed down a quick survey was made. It was discovered that the GCA controller had said, "You are left of centerline," when he meant, "Centerline is to your left." Instead of landing on the 8000 foot *left* runway, the aircraft landed on the 5000 foot *right* runway, which was also the only runway at Navy Blank without arresting gear.

This near miss was the result of a little "bum dope" from GCA followed by a snap decision by the instructor pilot to land after a waveoff had already been started. It could have been prevented if the pilot had continued his missed approach after initiating the waveoff. In addition, the tower would be wise to turn off lights on the short runway when GCAs are in progress to the long runway and the weather is at or near GCA minimums.

Flight Instructor Mouse

*This report should serve to remind pilots that a low-visibility approach is no place for assumptions. You had considerable help from the GCA controller and the tower in getting into this tight situation. It seems like good headwork for tower operators to light only the duty runway when approaches are being conducted under actual instrument conditions.*

## Near Miss

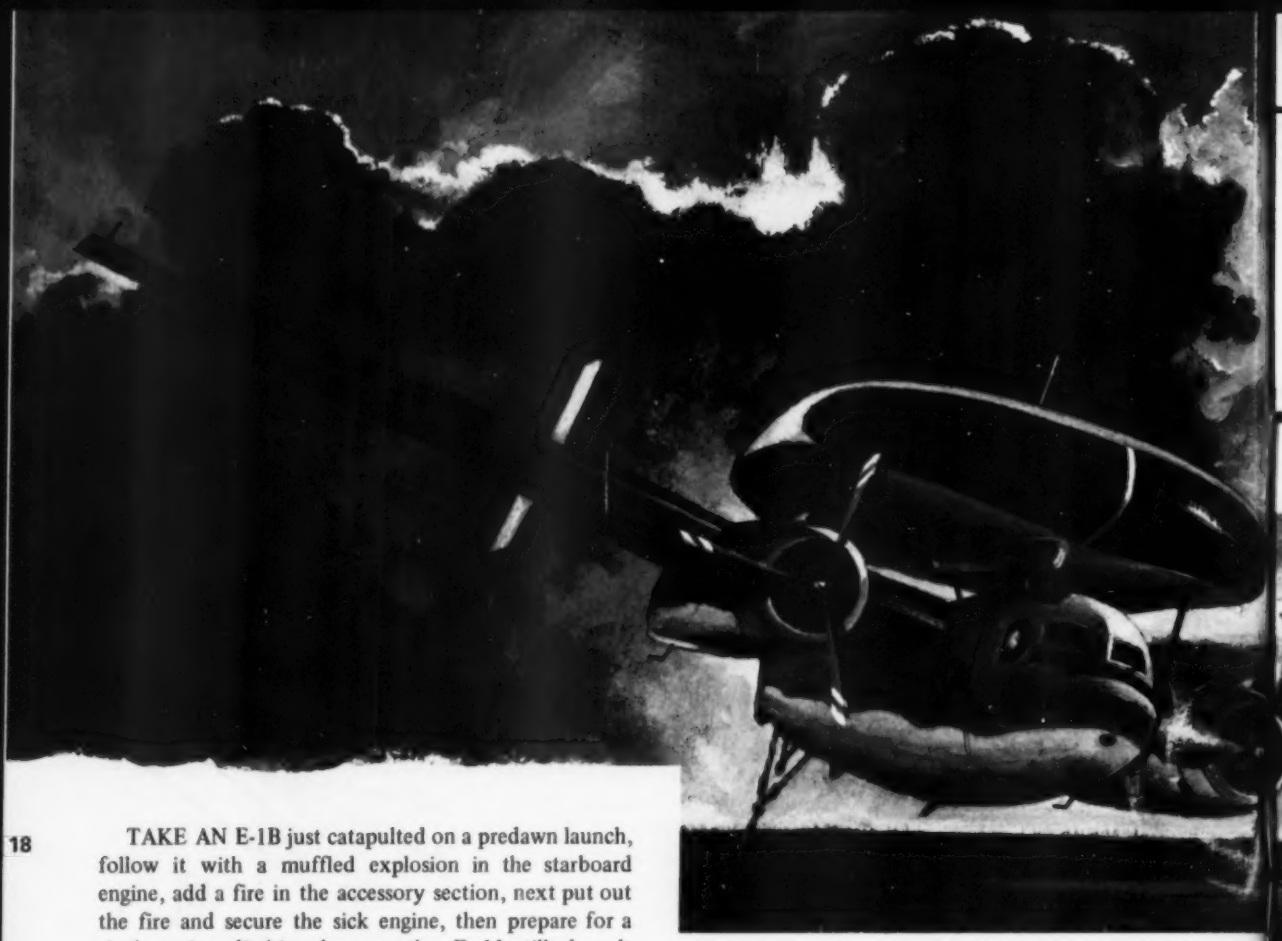
A PILOT was making a tacan approach to a west coast air station late one afternoon, with the setting sun obstructing his vision. He was in communication with approach control and had been cleared to land after terminating his IFR flight plan three miles out. At 100 feet altitude, one-quarter mile from the numbers and 60 knots of airspeed *(we infer that it was a helicopter because of the 60 knot approach speed – Ed)* he observed a Cessna 310 pass his nose from right to left on a departure climbout.

The pilot stated, "I estimate I missed the Cessna by 100 feet laterally and 25-50 feet vertically above him. Approach control gave me no traffic advisories anytime after initial contact. I could not see the Cessna during its roll because of the sun's position."

Scared Mouse

*We would say that you were most fortunate to come out of this with nothing worse than a palpitating heart! Although your report failed to mention weather conditions, presence of a copilot, specific type of aircraft, it appears there was a definite lack of essential communications between approach control and tower. When two different agencies such as approach control and tower are controlling landing and takeoff traffic on different runways at the same field, a potentially dangerous situation exists. It is mandatory that communications between these controlling agencies be timely and accurate.*

*Since you took the trouble to submit an Anymouse report, we trust that a near miss report was also submitted at the time of occurrence. If this was done, it should have helped to uncover any discrepancy in control procedures and to prevent future near misses such as you experienced.* ◄





TAKE AN E-1B just catapulted on a predawn launch, follow it with a muffled explosion in the starboard engine, add a fire in the accessory section, next put out the fire and secure the sick engine, then prepare for a single-engine ditching because the *Fudd* still doesn't want to defy the laws of gravity despite fuel dumping – and what do you have? You're right, brother, you have trouble and plenty of it! That's exactly what two pilots were faced with recently and this is a narrative of the events as they occurred.

Following a normal cat shot the E-1 was in a climbing attitude, flaps raised to 1/3, power at 2500 rpm and 45 inches MAP. Passing through 300 feet, the pilot reduced power to 35 inches and 2300 rpm to conserve fuel for the lengthy mission. Within seconds after power reduction a muffled bang was heard in the starboard engine accompanied by a bright flash in the engine nacelle. The copilot reported a fire in the accessory section; however, the fire warning light did not illuminate. At this time airspeed was 130 knots, flaps still at 1/3, rudder boost off and auto-feather switch armed.

The starboard engine was quickly secured by the copilot using the engine fire checklist. The engine auto-feathered properly and the starboard emergency fuel, oil and hydraulic shutoff switches were closed. Electrical cross-tie switches were actuated and the copilot commenced dumping fuel after visually ensuring that the fire was out. Dumping was secured with 500 pounds remaining in the port tank and 800 in the starboard.

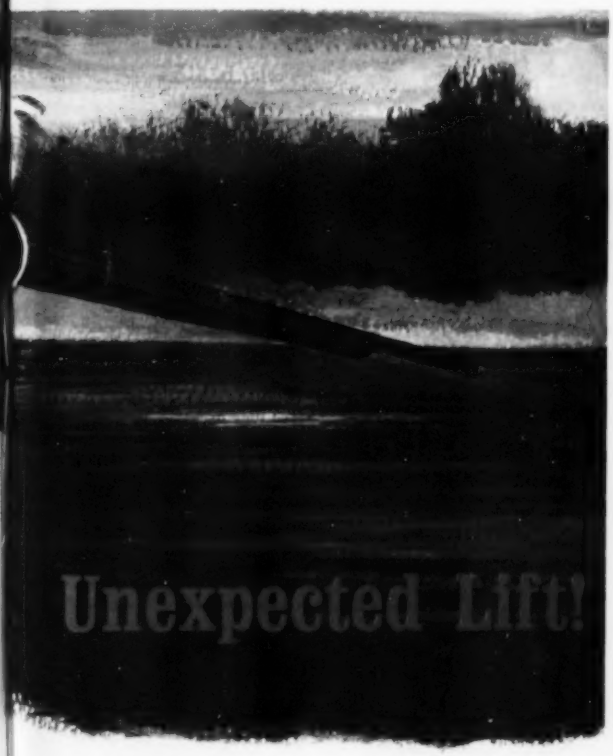
By this time the aircraft was at 200 feet in a gradual descent and with full power on the port engine, 105 kias with 1/3 flaps. The pilot noted his pressure altimeter approaching zero and ordered the number two operator's overhead escape hatch jettisoned, as ditching appeared imminent. Both pilots' escape hatches were also opened.

Meanwhile aboard the carrier the LSO had manned his platform, the Air Boss had a ready deck and a helo was airborne and standing by for rescue if required.

After getting the engine secured and alerting the crew to the possibility of ditching, the pilot had turned downwind into the landing pattern and was struggling for enough altitude to land aboard. As the aircraft approached the water (estimated at 10 feet actual altitude) it started to fly in ground effect. Gradually altitude was gained to 100 feet, but as a shallow port turn was continued toward the carrier, altitude was again

lost until a zero reading was indicated on the altimeter. At some point the copilot lowered the tailhook to serve as a warning in the event of contact with the water.

Up to this point the LSO had been a very interested observer and now offered encouragement to the *Fudd* pilots when he transmitted, "OK, it looks like you are going to make it all right. You're in ground effect and appear to be in a slight climb and accelerating a little." (To the two pilots and three other crewmembers aboard the *Fudd*, these words must have sounded mighty encouraging and held some expectation for terminating the flight other than with wet feet.) The pilot then requested that the barricade be rigged. This was




accomplished quickly and efficiently.

A first attempt to land was aborted because of insufficient altitude. The aircraft crossed from port to starboard astern of the ship and the pilot reported he was ditching. Once again ground effect kept the *Fudd* airborne just barely above water. At this point the Air Boss, who was an experienced E-1 pilot, recommended additional dumping of fuel to 600 pounds. As the pilot stated, "... since ditching seemed inevitable, further dumping was accomplished as a final attempt to gain altitude ..." The aircraft gradually climbed to 100 feet and a second landing approach was begun. This approach was a right-hand approach with the intention of landing wheels up if necessary.

Difficulty in hearing the ship's radio transmissions prompted the copilot to close his overhead hatch; this was followed by a slight but definite climb, so the pilot closed his hatch also. The aircraft climbed to 175 feet. A turn was commenced to final approach course and the glide slope intercepted. When a centered "meatball" was acquired, the landing gear was lowered. The two pilots had concurred beforehand to lower the gear on a good ball pickup. Close in to the ramp the aircraft started to go high. A verbal cut was given by the LSO and the *Fudd* picked up No. 3 wire and entered the barricade.

The primary cause of the accident was material failure of the engine-mounted gearbox, causing a fire in the starboard engine accessory section.

A contributing cause was the hot humid weather in the ship's operating area. Density altitude at the time of the accident was 1595 feet, a condition which contributed significantly to the marginal single-engine performance of the aircraft. In order to sustain flight the pilot had to dump below single-engine Bingo fuel. Darkness and the probability that a waveoff or bolter would be unsuccessful made barricade arrestment more prudent than an attempt at a normal arrested landing.

The Aircraft Accident Board recommended that embarked units operating the E-1B establish guidelines for pilots' actions in single-engine situations encountered at low altitude. In circumstances such as the one related here, the marginal single-engine performance of the E-1B may make it prudent or necessary for the pilot to disregard any attempt to reach a divert field and concentrate on dumping to minimum fuel in order to sustain flight.

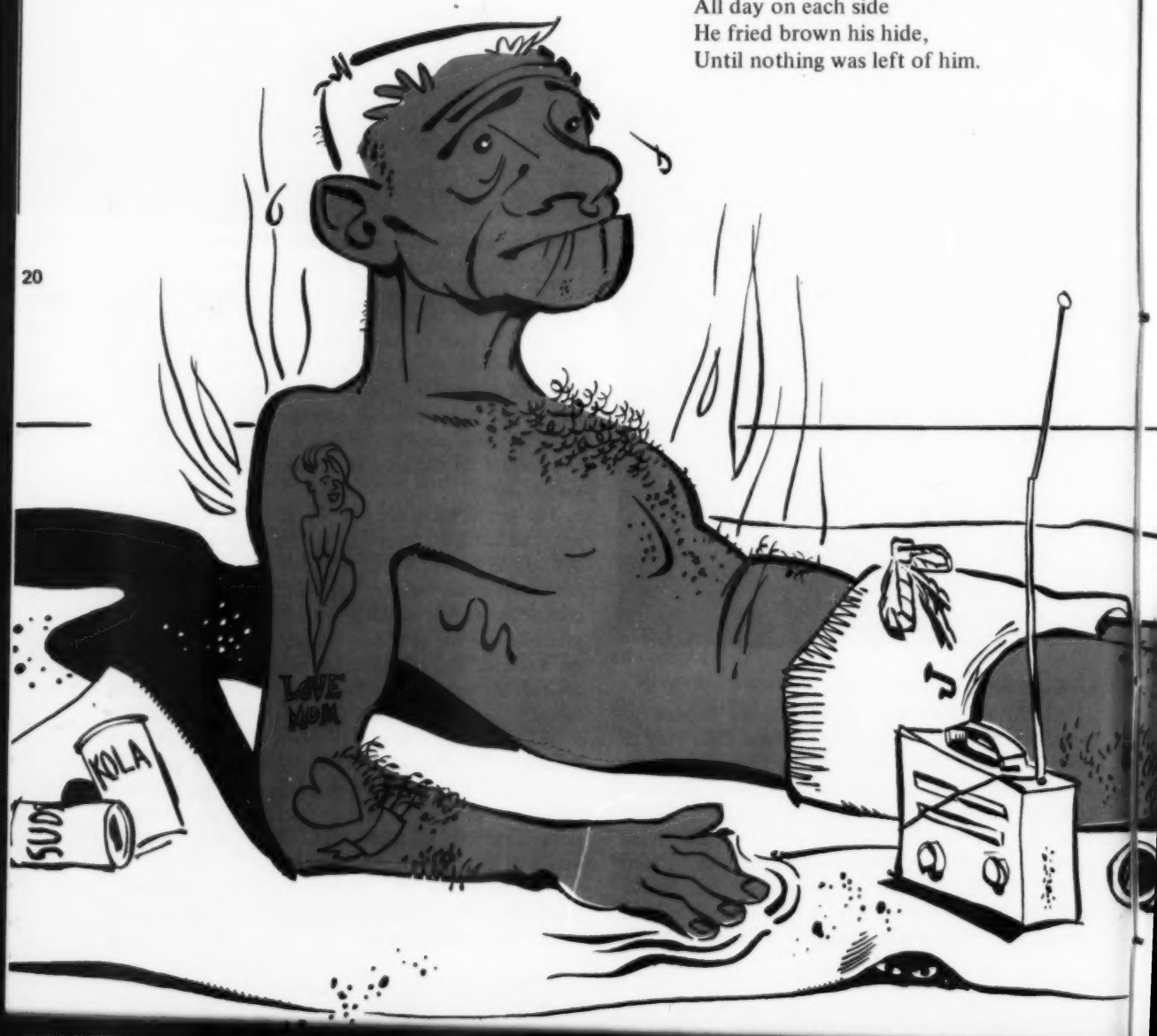
The action taken by the two pilots in closing their overhead hatches apparently was the single factor which changed an almost certain strike accident into one with only substantial damage. Because of this the Board recommended that the E-1B NATOPS Manual reflect the effect of opening or closing the pilots' overhead hatches on aircraft's performance. The small amount of drag created by opening these hatches could be a critical factor in another incident under similar circumstances.

In retrospect, the two pilots involved in this harrowing experience are to be commended for their professional performance and airmanship. The fact that they knew what to do, when to do it and then *did it* in accordance with established NATOPS procedures speaks very well for their training and ability.

The adage that "It's always darkest before the dawn" may well be remembered by this flight crew as the dawn that "they almost got wet!"

# Down to the

There once was a pilot named Jim,
Who went down to the beach for a swim.
All day on each side
He fried brown his hide,
Until nothing was left of him.



# e Beach

SUNBURN is rarely, if ever, fatal. But, on the other hand, it's a subject to be taken more seriously than usually is the case. The ego-pleasing aspect that we all look better with a suntan now has a trade-off to be considered – medical evidence indicates that excessive exposure to sunlight is a major cause of "aging" skin and of skin cancer as well. In addition, a pilot or aircrewman with a bad sunburn faces a hazard peculiar to his occupation. When you get sunburned, all the little capillaries in your skin dilate (this is what gives you that lobster look). The medics say this actually decreases your acceleration tolerance to a measurable degree. Furthermore, hours in strong sunlight on the beach or by the pool can adversely affect your night vision.

Now let's take a look at some information the medical world has come up with recently on the subject of sunburn.

The theory of sunburn is that when ultraviolet light waves hit the skin, the top layer absorbs some of the energy and then the remainder is scattered harmlessly about.[1] This top layer of skin thickens in self-defense, eventually scales off and then grows in again. A small amount of ultraviolet light energy does get through to living skin tissue and is enough to trigger physiological changes resulting in sunburn and suntan. Proteins in skin tissue absorb ultraviolet light. Their atomic structures become highly excited and briefly store a great deal of energy which then gets transformed into heat. What happens next is not completely understood but apparently this energy produces redness and

[1]This description of the process of sunburn comes from the American Medical Association's pamphlet, "The Case of the Sunburned Mannequins," 1965.

inflammation characteristic of sunburn and injured tissues. The result can be chemical breakdown of skin tissue and the beginning of the chronic, irreversible changes of skin degeneration. In this cumulative degenerative process, underlying elastic tissue is transformed into fibrous tissue. Its effects are visible in the form of flabby skin, skin folds and heavy wrinkles of aging skin. (Tell that to Mama on the beach some afternoon!)

In persons capable of acquiring a suntan, a small amount of ultraviolet light is enough to start dispersal of pigment throughout the affected skin area. Although tanning is looked upon generally as a protective mechanism, most dermatologists now consider it an injury to skin; one with effects not fully understood as yet. However, tanning *does* decrease damage from additional exposure to ultraviolet light.

How do we tan? Well, there are two ways. The first, dispersal of pigment already in skin, starts within minutes of initial exposure to ultraviolet light. The second is production of new melanin, the pigment of tanning. This doesn't start until 48 hours after your first session in the sun and it peaks about two weeks later. If you get sunburned to start with, damage is done before production of new tan reaches its optimum effect. That's why dermatologists recommend gradual daily exposure rather than weekend-to-weekend exposure. In this way the early dispersal process will continue long enough for full production of new melanin to take effect. This is particularly important for lighter-skinned persons who are capable of tanning.



Although it only takes a few hours for you to get an acute sunburn, major irreversible skin damage is produced by chronic exposure to ultraviolet light and accumulation of chemical changes over the years. The extent of damage to your skin depends on who you are and where you are. Dark-skinned people have more protection against ultraviolet rays than light-skinned people. Ultraviolet light is strongest at the equator and decreases as you go north or south. And no matter where you are, outdoor occupations increase exposure time.

**Reflections**

All our lives we've heard that water reflects the sun's ultraviolet light and that's why a fisherman gets more sunburn in an open boat. Not so, say doctors these days. Water is quite transparent to ultraviolet light and you can get sunburned legs even when wading around. The bait-dangler in an open boat gets more sunburn for two simple reasons: 1) he stays out longer because the breeze keeps him cool and comfortable and 2) on the water intense radiation comes from all sides from a sky unobstructed by buildings, trees or mountains.

The idea that a beach umbrella will counteract a sunburn problem has also been demolished. There have always been a few fair-skinned folks who complain they get sunburned even under an umbrella. Now medics can prove they are right. Ultraviolet light bouncing off sand can burn skin. (The same principle explains sunburn as you scoot down the ski slope.) Under a beach umbrella you are much more comfortable because you are shielded to a degree from the sun's infrared or heating rays. On open beach these rays would heat you up and alert you to impending overexposure. And what's true of bouncing ultraviolet rays on those R&R ski slopes and beaches is also true of your work environment as you move about concrete airstrips or the flight deck among hot and shiny aircraft. If you are susceptible to sunburn, you can get fried before you know it.

So what do you do if you are a towhead aboard a carrier in the tropics or at a base in Nam? Wear a sunscreening cream or lotion, don't work without a shirt and generally use common sense about the sun. If sunburn is a problem for you, see your medical department or flight surgeon. The medical department will probably recommend or furnish you with an effective sunscreening cream or lotion. (Don't *ever* use engine oil or lubricating oil for a sunburn lotion. Toxic ingredients in such oils can be absorbed through the skin.)

If you set out to acquire a suntan on the beach, at poolside or just sprawled in a sunny corner somewhere, take it easy and do it gradually. Ten or 15 minutes on a side is enough for the first day. If you must bake longer, do it before 1000 or after 1400 – the sun's rays are strongest during the four hours in between. Increase your daily dose of sun by about five minutes each successive day. And don't forget that you can still burn on a cloudy day or under a hazy sky.

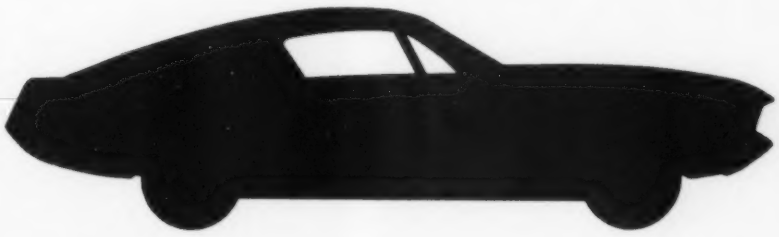
Before closing we should mention that we have a new sun-related problem these days which our ancestors didn't have to worry about – drug-induced photosensitivity. In certain individuals, commonly used drugs can alter the skin's normal protective response to sunlight and cause it to burn more easily or even break out at the slightest exposure to sunlight. Photosensitizing drugs include all sulfa-containing drugs, certain tranquilizers, certain drugs taken for high blood pressure and certain antibiotics. Your medical department can specifically identify these for you.

We don't have any idea that anything we've said here will put an end to sunburn but if you're going to be out in the sun, be careful. A bad sunburn can ruin your whole week and anyway, who wants to be plagued with skin cancer or be a leathery weather-beaten ancient at 35?

# Safe Driver's Pledge

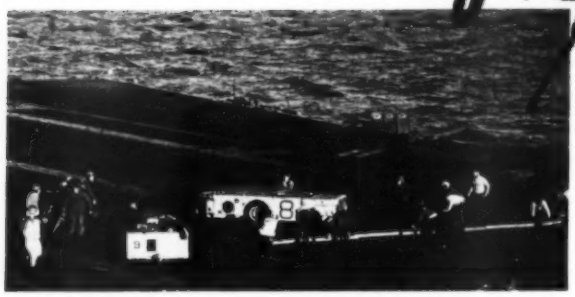
I am concerned over the fact that the number of fatal motor vehicle accidents in the United States continues to climb. I realize that this growing slaughter on the highways is not necessary, and by driving defensively at all times, in a safe vehicle and keeping constantly alert to compensate for the errors of other drivers, most of these fatalities can be eliminated. I hereby pledge that whenever I expose myself to the traffic hazards of an automobile, motorcycle or motorscooter, either as an operator, passenger or pedestrian, I will do all that I can to assure the safety and well being of myself and others who may be involved.

*NAS Lemoore Golden Eagle*



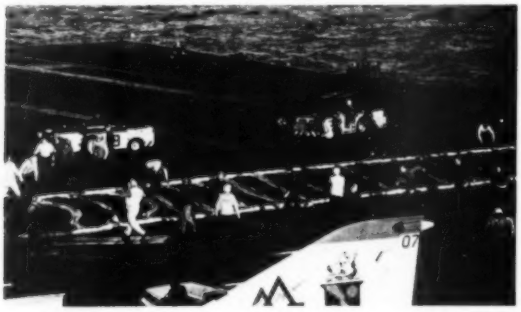
How about all hands taking this pledge?

# TEAM



The Air Boss passes the word, "Rig the barricade" and a high-speed team effort begins.

What appears to be a flurry of confusion is actually many men doing exacting jobs in absolute minimum time.



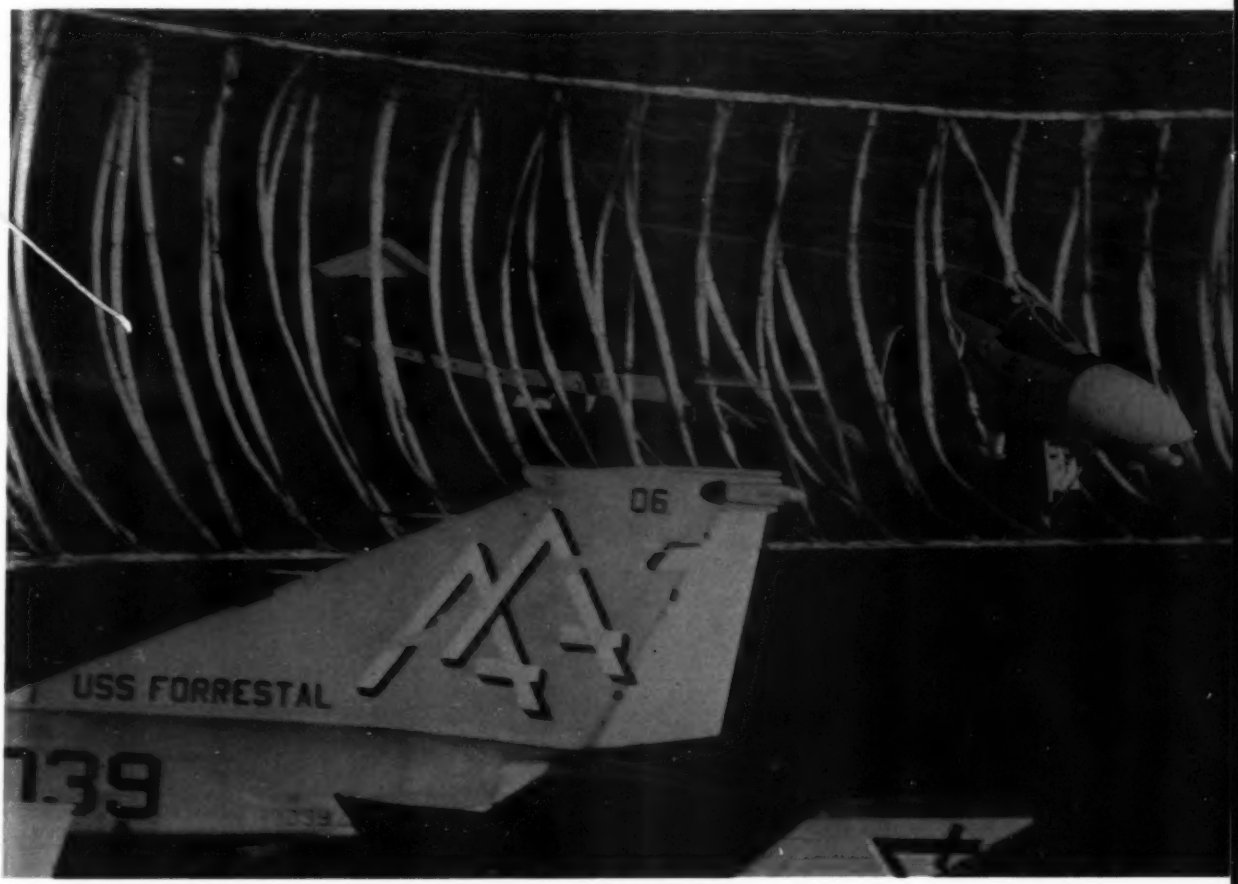
Scarcely two minutes have passed and the barricade is ready for engagement. The epitome of organization, efficiency and teamwork!

"RIG THE BARRICADE"– Aboard a carrier, these words are the starting signal for a chain of events which will hopefully salvage an aircraft and its flight crew for future operations. The primary reason for having the barricade rigged is that an aircraft in flight has suffered a casualty to some component which prevents it from being brought aboard via a normal arrested landing.

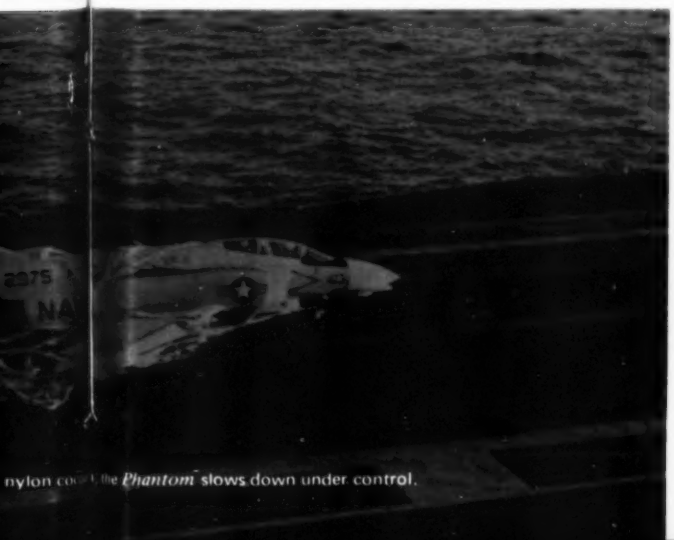
As time is almost always of the essence, the flight deck crew must be highly trained to respond to such an order in the shortest time possible. They must function like clockwork, every step being timely and in proper sequence, with an absolute minimum of lost motion. As all other normal "traps" must be held up during this type of operation, from start signal until the deck is again cleared for normal operations, these men function under terrific pressure. As to the sequence of a successful trap shown by the photos on these two pages, a "Well Done" is directed to all personnel involved.

Encased in a protective nylon co

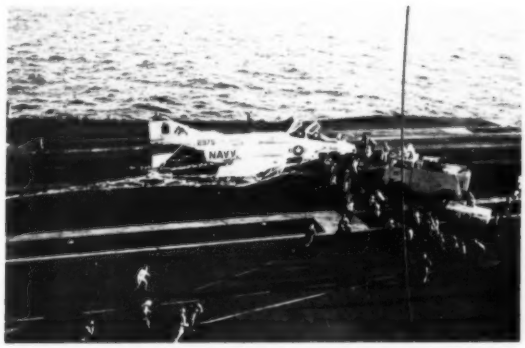
# EAMWORK Averts Accident!




With smoke streaming from its wheeless right MLG, the crippled *Phantom* skids into the barricade.



nylon cable, the *Phantom* slows down under control.




Safe! Pilot and navigator open their canopies as the crash crew stands by.

The aircraft continued to slide taking the second one with it.

# TWO TO GO!

LIGHTNING flashes in the distance illuminated the action on the wet flight deck as pilots manned their aircraft for the 0430 launch. The ship approached a rain squall as the final two aircraft were spotted on the catapults and Primary issued a hold signal because of a starboard wind shift over the deck. The yellow shirts had already moved quickly to begin breaking down drags and spares spotted aft for the pull forward prior to recovery. At the hold signal, aircraft being towed and taxied forward were halted and chocked.

Immediately following the hold signal, the ship began a hard starboard turn to pass through the storm front and an A-4F which had been a spare tanker for the launch began to slide out of its spot. The pilot pushed on the brakes and lowered the hook, and the aircraft came to a halt. The taxi director gave him a signal that chocks were in place and he raised the hook while

keeping his feet on the brakes. Several minutes later the aircraft began another sudden and rapid slide. The pilot lowered the hook again and tried every braking technique he knew with no success. Outside, the plane captain, blue shirts and taxi director tried desperately to stop the slide but it was no use – the aircraft continued its course across the deck.

The pilot of a second spare tanker which had also been broken down and stopped in the center of the deck by the hold signal was startled to see the A-4 sliding straight toward him. He took his left hand off the throttle and put it on the secondary ejection handle.

The first A-4 continued to slide, its nose section contacting the forward section of the second *Skyhawk*. Carrying the second aircraft along with it, the first A-4 hit the tail of an F-8 spotted on the port side deck edge and veered off. The two *Skyhawks* headed for the side. Both pilots ejected as the aircraft nosewheels went over the lip edge of the flight deck. Just as the two aircraft dropped into the catwalk the ship entered the center of the thunderstorm and began to encounter heavy rain and high winds.

Minutes later the crash crew put out a fire which had started during this evolution and then cooled some nearby bombs. After a burst external fuel tank was removed, the two aircraft were hoisted back on deck. Both pilots had entered the water under fully deployed chutes. In the darkness, bad weather and choppy seas, search and rescue began.

**Pilot Not Prepared**

Both *Skyhawk* pilots had their troubles in the water. The pilot of the spare tanker which was struck and carried over the side had not expected to be launched. He did not have the restraints attached to his torso harness tightened securely, his helmet chin strap fastened, his visor down or his oxygen mask fastened on both sides. (The fourth endorser to the accident report took note of this lack of preparation, requesting that the Air Wing conduct a review of survival procedures with particular emphasis on the probability of unexpected ejection from flight deck level.) In the water the unprepared pilot had to struggle to keep his head above the surface because he pulled only one of the two inflation toggles on his LPA-1 life preserver. He became entangled in shroudlines but was finally rescued uninjured except for a bruised knee.

The survival narrative of the pilot whose *Skyhawk* slid into the second aircraft is particularly well-written, conveying a feeling of "you are there." We pick up his story as his aircraft, along with the other A-4, is sliding rapidly toward the edge of the deck. Sparks flew as his plane, carrying the other with it, scraped the F-8's tail.

"Although from this point it was probably less than two seconds before I ejected," he begins, "many thoughts, questions and decisions went through my head before I pulled the ejection handle. After passing the F-8, I looked forward to see how close I was coming to the deck edge but, since the tower had turned down the white floodlights just prior to launch, all I saw was black. My next reaction was to look left to see if I could see the deck edge off to my side to better determine how close I was. I saw the other A-4 already over the edge pointing nose down. I then looked forward again. The deck edge has a large lip around it which sticks up several inches and the thought went through my head that the lip might be enough to stop me. But even as I thought it, I knew that I was moving too fast.

"Since the advent of the zero-zero seat in the A-4 I had preplanned a long time ago that I would eject if I started going over the side rather than ride the aircraft

into the water. I wanted to eject *before* the plane went over and while it was still upright in order to have a vertical rather than a horizontal ejection. But I had a fear of ejecting too soon since I was not sure whether I was clear of the F-8's tail and the thought still persisted that possibly the deck edge lip might stop me. So I decided to wait until the last moment, at least until I reached the lip and was clear of the F-8's tail.

"I next heard the boom and saw the flash as the pilot of the other A-4 ejected. I knew immediately what it was. The next sequence was quite simple: I felt the nosewheel hit the lip, felt no resistance and pulled the alternate ejection handle. I wanted to grab the handle, straighten my back, then pull, but the handle did not seem to travel as far as I had expected before the canopy blew and I was ejected. I think I was slumped forward as I went out since I could see flames from the rocket between my feet. I remember the canopy coming off but I do not remember any hesitation in travel of the handle between the time the canopy blew and firing of the seat. The force of the ejection was not as great as I had expected. I separated from the seat as the handle came out and the bladders pushed me forward."

**'The shroud lines were wrapped around my neck, shoulders, arms and legs. I took off my glove to see if I could feel for the fittings.'**



### Touch of Panic

"After I separated I experienced my first touch of panic. I felt that I was falling through the air for an excessively long time and I thought that the chute was not going to open. I began to reprimand myself for not manually pulling the D-ring immediately after I separated from the seat. I reached for it but did not find it and, as I reached, I noticed something orange above my head, immediately followed by my impact with the water. The 'orange' I saw must have been the fully blossomed parachute because my impact with the water was rather soft.

"After impact I found myself treading water with my head well above the surface even though I was still breathing through my oxygen mask. After gleefully expressing my happiness that I was still alive, I gathered my wits, inflated my LPA-1 and then removed my oxygen mask. The LPA-1 seemed to bind my head and restrict my movements but it kept my head well above water.

"I was wearing the standard survival vest. *(However, this pilot was wearing Marine fatigues instead of a nomex flight suit. – Ed.)* In the left pocket I had three day/night flares and a PRC-90 radio. On the front of my vest I had a PRC-63 radio, baby bottle and shroud cutter knife. In the right pocket I had a general SEEK kit and three more flares. I had a strobe light on my right shoulder and a .38 pistol loaded with five flare cartridges on my right hip. In my anti-G suit pockets I carried a medical SEEK kit and candy. I had a mirror in each pocket of my survival vest and one in my anti-G suit pocket.

"I first turned on the strobe light. Although the flash was very bright, it didn't bother me. I then reached along my shoulders for the koch fittings so I could release my parachute but I couldn't find them. I took my radio out but replaced it when I saw the destroyer go by. I wanted them to see me so I pulled out my .38 and fired two rounds. The destroyer was several hundred yards away with searchlights scanning the water but they never seemed to point them in my direction. *(The helo pilot reported later that the destroyer's lights flashed into the cockpit and moved back and forth, enhancing the vertigo-inducing situation of near zero-zero visibility, lightning and heavy rain. The helo's automatic approach equipment was inoperative.)* I had the thought that maybe I could get the destroyer crew's attention if I fired directly at them but, not wanting to waste my rounds, I replaced my pistol and again brought out my PRC-63, turned it on and transmitted. What I transmitted I'm not sure but I received no response. I selected full volume but I couldn't hear any static nor could I hear a beacon signal when I switched to beacon position. I again transmitted in the blind, then left the radio on beacon position and replaced it in my survival vest pocket.

"I again felt along my shoulders for my koch fittings but I still couldn't find them. Now I realized how completely entangled I was in shroud lines. They were wrapped around my neck, shoulders, arms and legs. At this point I took off my right glove to see if I could feel better for the fittings. With increasing determination, I felt back as far as I could on my shoulder, then down to what I thought was my survival vest. I did this several times until I finally located the fittings – very low, about stomach level, and protruding somewhat. Once I found them, I had no difficulty releasing them. I pushed the risers as far away as possible, attempting to free myself of shroud lines but I was still entangled.

"When I was attempting to free myself from the lines, I noticed that each time I moved my arms I felt a pain in my right chest and could hear a cracking sound. I was sure that I had broken some ribs so I decided to make each of my movements very slow, fearing that I might puncture a lung if I twisted or moved too rapidly. *(At*

*physical examination after rescue, this turned out to be a dislocated rib, muscle spasm and moderately severe pain of the back from unknown origin.)*

"I then removed the shroud cutter from the front pocket of my vest and began to slowly cut shroud lines. By putting a little tension on the lines I could cut them quite easily but this required holding lines with one hand and cutting with the other. The pain in my chest increased the more I struggled with the lines. I cut and cut and cut but I was still entangled. A flashlight would have helped me. I still had my penlight in the left pencil pocket of my flight suit but I remembered that the batteries had died during preflight of my airplane so I never tried to use it. The flash from the strobe light was too quick and came at too great an interval to be useful.

"My concern for getting free of the shroud lines was not because I felt the chute was pulling me down but because I knew I had to be clear of the chute before the helo could hoist me out of the water, if and when it arrived."

**Rain Squall**

"After 10 to 15 minutes in the water, a rain squall came up which caused the water to become rougher. Rain, plus the choppy water, began to splash in my face and make breathing a little bit more difficult. Being an old California beach boy, water in my face didn't bother me but it did somewhat slow down my efforts to disentangle myself. The rain decreased visibility so that I was no longer able to see lights from the ships.

"The rain and wind subsided in about 10 minutes and I could see lights from the ships again. I could see the helo circling near the carrier and there appeared to be an orange-white glow coming from the carrier. I thought a fire might have started on the flight deck and that there were probably a lot more people in the water than just the other pilot and me. I thought if that were true it was going to be a long wait so I again slowed down my efforts to disentangle myself and took longer rest periods."



**Debates Raft Inflation**

"Since I was probably going to be in the water some time, I debated whether or not I should open my seat pan and inflate the liferaft. I decided against this since the raft and all attached items would just become entangled in shroud lines and create more of a mess than already existed. Secondly, I figured I would never be able to pull myself into the raft without further injuring myself since the LPA-1 and entangled shroud lines restricted my movements to the point that getting into the raft would require major physical effort. I also felt that the seat pan was entangled in shroud lines and might be one of the things still holding me to the chute.

"Since I wasn't going to use the liferaft and the seat pan was tangled in the lines and certainly wasn't adding to my buoyancy, I decided to dispose of the seat pan altogether. I released both lap rocket jet fittings and tried to kick the seat pan away. It was still tangled since I could feel it tugging on some lines wrapped around my

legs. I cut a few lines around that area but still wasn't sure if the pan was clear of me."

**Helo Approaches**

"Soon thereafter I saw a helo approaching my position. I pulled out my pistol and fired three rounds, then I went down to my left vest pocket to pull out a day/night flare. The zipper on the pocket was difficult to open with just my left hand and I couldn't get my right over to help manipulate it. Finally after many tugs and pulls the pocket unzipped just enough so I could pull out a flare. With my ungloved hand I could easily feel the nipples indicating the night end. Although the strain of pulling the ring caused some pain in my chest, the flare ignited easily. I was disappointed on how short the burning time was. *(Burning time is usually 18 to 20 seconds.)*

"The helo was some distance away so I reached for my PRC-63 to see if I could contact him and advise him of my plight with the shroud lines. I held the receiver close to my helmet and tried to pull it away from my ear so I could hear if he transmitted but there was no response. I was tempted to take off my helmet, thinking I could hear better that way, but I was afraid I might lose it. I very definitely wanted my helmet on since I was afraid the rescue seat might hit me when they lowered it or that I might bang my head when they brought me up to the helo (which I had heard has happened before).



"Thinking that my PRC-63 was not working, I was about to reach for my other radio, the PRC-90 in my left vest pocket, when the helo stopped and hovered about 200 yards away. I thought possibly he had heard my transmission about the parachute still being attached and was waiting there to keep me in sight while they were preparing an aircrewman to come down after me. After the helo hovered for several minutes, it turned tail and flew away. What now? Were they going to send in a destroyer instead? I decided later that the helo must have been picking up the other pilot.

"I was sure they had my position marked so, rather than bring out my other radio which would have required another one-handed struggle with the survival vest zipper, I just sat back (or I should say, floated back) and waited for someone or something to pick me up. I made a few more futile attempts at the shroud lines and was proceeding to reload my revolver when I spotted the helo closing in on me again. He was coming straight for me so I assumed he was homing in on my strobe light. Thinking he might see my strobe light better if it were higher, I reached for my right shoulder where the light was sewn on and ripped it off. Then I thrust it above my head. Reflecting back on the logic of this act I must

admit it was a pretty dumb move because I dropped the strobe light and lost it. *(Air Crew Systems Bulletin 150 covers installation of velcro hook tape on the survival light and velcro pile on the helmet so you can attach the light to your hardhat in just such a situation.)*

"The helo moved in towards me and I was forced to close my eyes as rotor wash pelted my face with water. But once the helo was overhead, the blast subsided and I could see quite well. I was amazed at how bright the helo searchlights were and how well I could see around me. I could see that the helo crew had lowered a horse collar sling and it was slowly moving towards me. It came close enough for me to have grabbed it easily but, since I was still entangled in shroud lines, I started making pushing motions to indicate that I did not want to take the sling. After the sling swung past my head several more times, the crew finally got the idea and raised it back to the helo."

'The helo moved in toward me and I was forced to close my eyes as rotor wash pelted my face with water.'

**Crewman Comes Down**

"The next thing I saw was a crewman standing on the sling as it was being relowered. The mind at times must want to alleviate itself from the gravity of a situation since the thing which fascinated me most was the fact that the crewman had flaming red hair which glowed against the white searchlight. As he swung nearer I could also see he was wearing a face mask and a fin on one foot. He landed less than 10 feet from me, then swam over and asked what my problem was. I told him about my injury and the shroud lines, whereupon he pulled out a large knife and dove under the water. I could feel him tugging and pulling on the lines and I fully expected I would be stabbed at any time. After several more dives and thrashing about, he told me I was clear of the chute. I must have already cut away most of the shroud lines since it took him less than a minute to free me."

"When I was free the crewman told me I could get into the horse collar. Knowing this would require hanging on with my body stretched out, I was afraid that I might further injure myself and the pain or fatigue might be too great for me to be able to hang on. I knew the horse collar had a hook on it that I could attach to the loop in my torso harness but that, too, would mean my body would be stretched. So I asked the crewman to have them send down the jungle penetrator seat. Evidently there was no hand signal for bringing down the seat because the crewman said he would have to get it, whereupon he climbed in the horse collar and was hoisted back aboard the helo.

"The helo then backed off about 50 yards just outside the range of the searchlights. At this point I thought I was in deep trouble. How was he going to see me? I had dropped the strobe light. In his enthusiasm, the crewman had cut the retaining line for my pistol and two lines that were holding flares in the left side of my vest. I had two more flares in my right pocket but the pain in my chest told me it would take some time for me to get them out. I had this compulsion to whistle and wave my arms when I noticed something blinking in my eyes. Evidently my strobe light or one left by the crewman was wedged in the front folds of my LPA-1 life vest! I held the light above my head again as the helo came in over me with the crewman now standing on the jungle penetrator seat.

"The seat and crewman landed about 10 feet from me and as I started to awkwardly paddle towards it, my legs began to cramp. I must have unconsciously been kicking while struggling with the shroud lines. Prior to the cruise I had been swimming almost every day and was surprised at how out of shape I had gotten in just two months.

"The crewman did almost everything from then on. He pulled the seat paddles down, placed my legs over two of them and folded my arms around the seat trunk. He said that he couldn't strap me on because the strap clip was broken and asked if I could hold on all right. I told him I didn't know since I wasn't sure how much strength I had left. I thought he was going to climb on with me to help hold me on the seat but he indicated he

wasn't going to and asked again if I could hold myself on. I tugged with my arms to test my strength and told him yes, I thought I could. He gave a signal and I felt a sharp tug as I broke the water's surface.

"Since I had my eyes closed I don't remember the ride up to the helo but I had plenty of strength left to maintain my grip on the seat. Remembering not to reach out for the door, I hung on until they pulled me inside the helo. They had to pry my arms and legs from the seat! Then the crewman was quickly retrieved and we proceeded back to the carrier. I began to feel chilled – I don't know whether I was getting cold or just suffering from shock but I began to shake."

**Recommendations**

The pilot whose survival account you have just read has made a number of recommendations concerning the accident. We will quote here only those bearing on survival:

"• My radio was later found to function normally. During SAR efforts, all stations should ensure they are monitoring guard and that their volume is turned as high as possible. All transmissions should be answered or relayed to SAR control.

"• Survival vest pockets should have a double zipper so they can be opened without going around corners. This will enable the vest to be opened with just one hand. *(The squadron C.O. strongly endorsed this recommendation and the proposal is under squadron study.)*

"• All survival items that the pilot wants to ensure he doesn't lose should be tied with something other than thin shroud line so it is not mistakenly cut. *(Safety Center survival personnel recommend dyeing shroud line for identification (daytime only) or knotting the line for day and night identification.)*

"• A strap on the shroud cutter knife that could be tied or snapped to the wrist is recommended. The knife would not be lost if the line attaching the knife to the vest is inadvertently cut.

"• I believe the horse collar is unsatisfactory for any type rescue operation when compared to the jungle penetrator seat. A survivor in the water must lift the collar over his head with the turnbuckle or hoist line in front of him in order to place the collar past his shoulder. The normal reaction, however, is to swim through or place your arms and shoulders through first, leaving the bottom part of the collar against the chest and the turnbuckle at the back. This means you must either turn on your back if the collar is partially out of the water or tug the collar around to the proper frontal position if the collar is floating. Each case requires substantial physical effort. When being pulled out of the water you are again required to use a substantial amount of strength to hold on, even though most of your weight is taken up under your armpits. If injured or fatigued you may relax and slip out should you forget to fasten your torso harness to the clip ring. In all cases, the seat is the easiest to mount. For water rescues the seat prongs should be extended before being lowered. The seat should also have a snap hook which can be positively fastened to the torso harness. I have not seen the basket type device (Billy Pugh) in fleet use."

Since this accident took place, NavAirSysCom (Naval Air Systems Command) has stated that the primary procedure for helicopter rescue of downed survivors will be use of the Navy two-pronged rescue hook combined with a Kaman penetrator. The penetrator will be supported by one prong of the rescue hook and the rescuee will be attached to the other prong by the V-ring on his torso harness. If the rescuee is not wearing a torso harness, he will ride up sitting on the Kaman penetrator. The alternate device will be a modified rescue net for operations where conditions make its use more advantageous than the hook and seat.

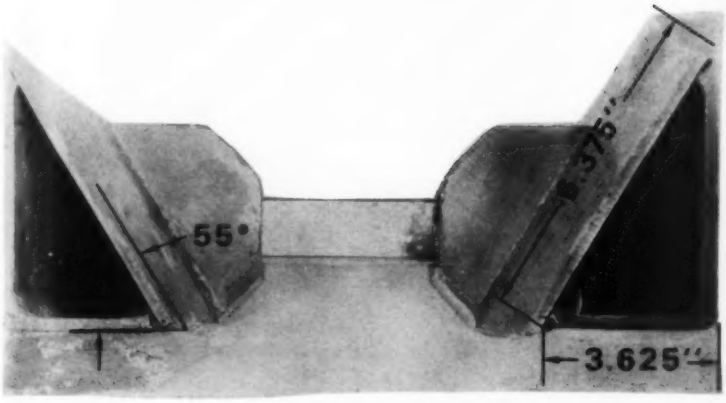
An endorser summed up his feelings about this accident rather nicely: "That this accident did not result in more serious injury or fatalities can only be considered miraculous. It is a vivid lesson on the vigilance which must be maintained in all evolutions concerning carrier operations. It is highly unlikely that another accident of this type would end as fortunately."



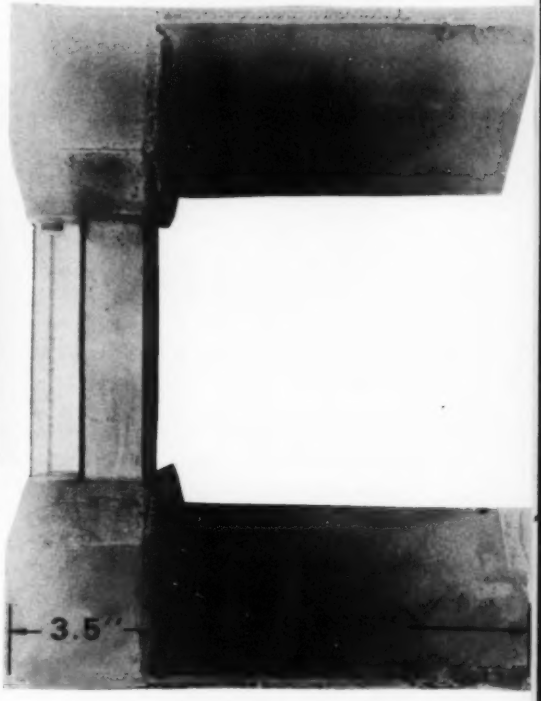
Don't just wish for fewer accidents.

do something about it.

# CORAL SEA CHOCK




Side view of modified MWC-2 chock.




Plan view of modified MWC-2 chock.

BESIDES revised procedure for unchaining aircraft and movement of aircraft aboard this particular ship, out of this accident came the recommendation that a modified chock (the so-called CORAL SEA chock) be evaluated. The skipper of the carrier involved had this to say:

"Witnesses' statements indicate that the aircraft was properly chocked but that the aircraft commenced to slide and could not be stopped using the standard chock, the MWC-2, FSN IRM1730-974-4116 SX3X. An investigation on board using the standard chock confirmed that a chocked aircraft with small wheels could be moved across the deck, brakes off. The chocks, although remaining in place, slid across the deck with little impedence to aircraft movement. The test consisted of attempting to move an A-4 aircraft with a tow tractor when the aircraft was chocked. Deck condition was dry with good non-skid surfacing. The test was repeated using a modified (CORAL SEA) chock. The aircraft remained in place. The improvement of the modified chock's holding capability over the standard chock is attributed to an increase of the downward pressure vector as the wheel is rolled or slid forward against the face of the chock. The disadvantage of the modified chock is that the modification somewhat reduces flexibility in its use (i.e., the moveable block end may be aft on one wheel and forward on the other). This disadvantage is considered far outweighed by its increased holding capabilities."

The C.O. strongly recommended that the CORAL SEA chock be adopted for shipboard use on those CVAs operating aircraft with small wheels, particularly A-4s. In its final endorsement, ComNavAirSysCom states that NAEC (Naval Air Engineering Center) is conducting an extensive investigation of the CORAL SEA wheel chock. This includes an engineering evaluation and suitability study plus the actual testing of fleet-modified wheel chocks. Future NavAirSysCom action will depend primarily on NAEC's conclusions which are expected to be available soon.

Photo 1

Photo 2

## Helmet Saves

TWO HELMET saves aboard CORAL SEA since the beginning of her current deployment demonstrate the worth of the flight deck cranial helmet.

On the final launch cycle late one night, the second aircraft to launch was an F-4 from the No. 2 catapult. As the aircraft went down the cat, a man positioned at the nose tow box about 35 or 40 feet forward of the JBD (jet blast deflector) felt something hit him in the back of the head which he later said "felt like a crowbar." A piece of wire had penetrated his helmet about an inch. (See photos 1 and 2.)



The second helmet save took place when a sudden jet blast struck three men standing near the island structure. Although the men were braced for the blast, one was swept from his feet and thrown 15 feet back into the leading edge of an aircraft wheelwell door and finally into the opposite wheel assembly. According to the ship's safety officer, although the man was hurt, his injuries could have been much more serious had he not been wearing proper protective gear. His helmet may well have prevented a depressed or compound skull fracture or even death. (See photos 3 and 4.)

Photo 3

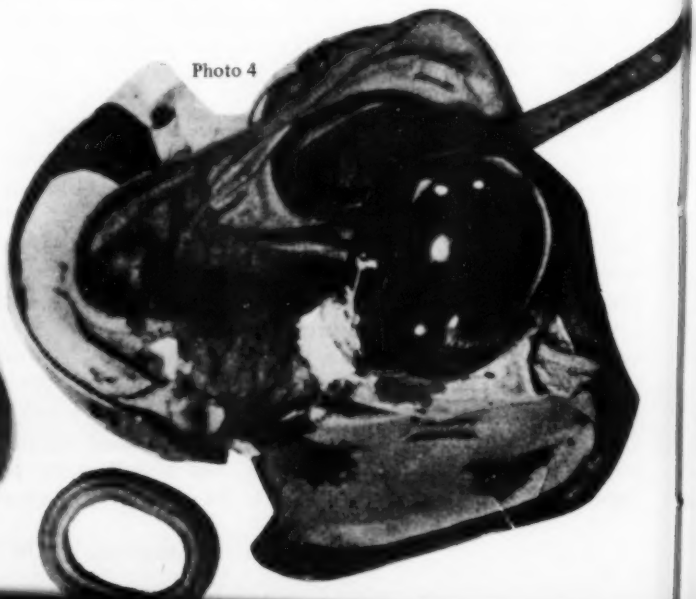


Photo 4

# notes from your flight surgeon

### Slight Delay

AN F-8K pilot in an *extremis* situation pulled the face curtain to the first stop and the canopy jettisoned. Thinking he would soon follow, he waited a very short length of time before continuing to pull the face curtain down to complete the ejection. He ejected in a spin at 145 knots and 500 feet.

"As he was in the air under the parachute for only approximately 15 seconds," the investigating flight surgeon commented in his report, "I shudder to think what this fraction of a second delay would have resulted in if the aircraft had been 50 feet lower."

*The F-8K NATOPS Flight Manual* states: "Pull face curtain out and downward in one firm, continuous motion. The canopy will be jettisoned. A slight delay in curtain travel might be noticed during canopy jettisoning. Continued pulling on face curtain will eject the seat."

If you're put to the final test, *your* knowledge of your aircraft's escape system is what you are going to have to depend on to save *your* life.

### Midair Debris

"IMMEDIATELY after the impact of the midair," the pilot of an A-4C reports, "I was hit in the face by flying debris, most of which was stopped by my helmet visor."

When the right side of his visor broke off he sustained minor abrasions of the forehead. The fact that he had his visor down may have spared him more serious injury, the investigating flight surgeon stated.

The pilot ejected successfully.

### Mae West Slips

A CREWMAN aboard an SH-3A which crashed into the water and burned was wearing his Mk-2 life vest too loose. Consequently he almost *lost* it.

"I felt a big jolt, saw a red flash and heard a terrific noise of scraping and tearing metal," he said. "That was the last thing I remember except that I seemed to feel that I was floating in air until I came to underwater. I reached for the toggles and had trouble finding them. I pulled one toggle, the vest inflated partially and I rose to the surface. I didn't have the vest on tight and it slipped off my head. I pulled it back on, popped the other $CO_2$ cartridge and readjusted the straps."

It is difficult to see how this could happen if the vest was fitted properly in the first place. Initial fitting procedures for the life vest, to be performed before the first flight using a new life vest and then at specified intervals, are as follows:

1. Don uninflated vest, then secure harness link fastener, lift-the-dot fasteners which join the lobes together at the front and snap fasteners which hold lobes to waistbelt.

2. Inflate vest to maximum volume by use of oral inflation valve.

3. Adjust harness adapters so that a comfortable but snug fit is obtained.

4. Deflate vest by depressing oral inflator valve. If leakage occurs during fittings do not use vest.

5. Make sure all compartments in vest are completely deflated. The reason for this is that trapped air will expand at altitude and enlarge vest causing restriction and discomfort under a parachute harness.

*Careful preflight of your personal flotation equipment pays off in an emergency.*

### For Protection

THE copilot in a UH-2A accident was not wearing gloves and had the sleeves of his khaki flight suit rolled up. He sustained severe burns of his hands and forearms.

Safety Center comment: The copilot was in violation of all general flight safety requirements by not wearing gloves or nomex flight suit. Authorized flight suits are designed with long sleeves for complete arm cover and must be so worn for protection against burns.

### Lawn Mower Accident

AN accident off the job can cause as many man-days lost as if it occurred in the squadron hangar or aboard ship.

A naval aviator was mowing his backyard lawn. While walking backwards and pulling the power mower, he tripped and fell. His left foot went forward and under the rotary blade housing of the mower which was simultaneously being lifted by his efforts to regain his balance. His left big toe was amputated.

The irony here is that this naval aviator no doubt routinely wears his steel-toed safety shoes at work.

*Under no conditions are you supposed to pull a power mower while walking backwards! (Why? Evidence the incident recounted here!) If there was a NATOPS on power mowers, that's what it would say.*

# A New Use for the Oxygen Mask

By LTJG M. E. Liebman
PAO, HC-2 Det 66

HELICOPTER pilots who have done SAR work will tell you that one of the hardest parts of the job is to hear the rescue aircrewman's directions over the surrounding noises. During a rescue this lack of communications is not caused by the aircrewman's verbal ineptness but rather by his environment. Once a survivor has been found, the aircrewman's job is to help the pilot maintain a steady hover over the rescuee. Aircrewmen must often lean out of the helicopter (with a belt on, natch) not only to watch the survivor but also to be ready for hoist operation.

In the past, aircrewmen wore the standard APH-6 crash helmet. However, this excellent piece of head protection was not suited for good communications in the noisy interior of helicopters. To rectify this situation the SPH-3B was developed. This helmet helped an aircrewman hear the pilot; however, when the aircrewman stuck his head out of the hatch during a rescue he became virtually unreadable over the ICS. Each time he keyed his mike he not only transmitted what *he* was saying but also background noises – wind blast, engine and transmission noises – all of which cause garble. Even shouting didn't help. Raising the voice does not erase the garble, it just increases the decibels.

Figure 1. This picture shows the interior of the mask after the intake breathing apparatus has been removed.

Figure 2. This is a general internal view of the mask showing the mike and exhalation valve. Mike cord and strap are the same as those being used by aircrewmen.

Figure 3. A front view of the mask shows the portion of the face that is covered. This visor will easily protect the upper portion of the face, thus giving a greater safety margin to the aircrewman. Elastic strap comes down to mask from its position high on the helmet.

### A Cure

SAR squadrons on the West Coast, HC-1 and HC-5, have experimented with using a surveyed oxygen mask as a shield for the aircrewman's mike. They removed most of the breathing apparatus inside the mask (shown in the photograph) and left the mike and exhalation valve. However, the SPH-3B does not have fittings for a mask, so they were left with the older APH-6 and a mike shield. This was not entirely satisfactory but it was better than before. HC-2 picked up the idea and also began to experiment. The main problem was to adapt the mask to the SPH-3B helmet. An answer, so simple that everyone had overlooked it, came to light. It involved removing the fittings on the side of the mask and equipping it with an elastic band that would keep the mask tight and ensure a good fit around any helmet. (The photographs show how.) The first few trials indicated that the elastic band would keep the mask on but it would not maintain a good fit because of wind buffet. However, more trial and error experimentation revealed that if the strap was pulled up, almost to the top of the helmet and behind the visor slides, the mask maintained a tight seal. More modification to the mask was carried out by substituting one of the new dynamic mikes from the SPH-3B helmet for the original mike. This slightly muffled the aircrewman's voice but his transmissions were very readable. Field trials were conducted during regular training flights at HC-2's home base, NAS Lakehurst. More experimentation was done by HC-2 Det 66 aboard USS America while the ship was undergoing refresher training at Guantanamo. Once the aircrewman became accustomed to wearing the mask properly, he could lean out of the helicopter for extended periods and be guaranteed that he could always be understood by the pilots.

One additional byproduct was found which increased safety for the aircrewman. The mask provides more face shielding for protection from bug strikes. Pilots who have worked with aircrewmen using the mask are very pleased with the results. They no longer have to guess what the aircrewman has said. The modified oxygen mask is a boon to all pilots and aircrewmen but mostly it will help those being rescued by making rescues more expeditious." ◄

Figure 4. In this side view of mask and helmet, the proper strap position can be readily seen. Note its proximity to the visor slides.

# GOOD DEAL

THIS is the time of year when Momma takes a long steely-eyed look at herself in her full-length mirror and begins to wonder how she's going to get into her old bathing suit – or for that matter, into any bathing suit. This is one way of easing into our subject for today. Have you taken a good hard look at *yourself* lately? Did a deep, deep breath and an attempt to vacuum your chin/chins up under your tongue improve your reflection? Before your ego corrects your image and you begin to look pleasantly healthy and mature to yourself – a fine specimen of *homo Americanus spreadicus* – be realistic. Are you getting out of shape? Or to put it more bluntly, are you getting fat?

The most popular time for sober second thoughts on weights and "figgers" is a month or so before that recurring day of reckoning – the annual physical. How many of us have gone on a crash diet just short of our birthdays, gotten the old weight down to an acceptable level and then, unless the flight surgeon monitored us in a follow-up program, forgotten about it for another year? This may do the trick as far as passing physicals goes but, over the long haul, it doesn't really help out a whole bunch.

### A Pile of Data

Insurance companies, which are *almost* as interested in our longevity as we are ourselves, have masses of data on the subject. Their statistics show that folks who are overweight seem to be more susceptible to certain diseases, may have less resistance to infection and even tend to have more accidents in the daily course of events than do slim people.[1] Excess weight puts a burden on the entire body and a special strain on the heart.

A few years ago the insurance industry made a study based on roughly five million policyholders spread

[1]Metropolitan Life Insurance Co., "How to Control Your Weight."

throughout 26 large life insurance companies in the United States and Canada. This study confirmed anew the adverse effect of excess weight on the health of adults, particularly men, by showing a significant increase in mortality with each increasing degree of overweight. The "excess mortality" among overweights, as the insurance companies put it, is accounted for by a variety of causes but chiefly by diseases of the heart and circulatory system. The study also showed that the average weights of men, particularly young men, are higher than their counterparts a generation ago. Moreover, most of the gain in weight with age among men now occurs between 25 and 40.

On the other hand, Momma and her bridge club members are lighter than they used to be, particularly in their 20's and 30's. They don't usually put on much weight as they get older until after they reach 45. In light of this it is significant that in the last few decades female mortality has *declined* sharply while, as the study says, "the trend of mortality among men has been much less favorable."[2]

### It's All That Good Chow!

Personnel of the United States Navy are probably one of the best fed populations in the entire world. And besides all the goodies in three square meals a day, there are gedunks, vending machines and TV snacks. This is not to mention all those bar nuts, pretzels and high-calorie beverages consumed "on the beach."

A couple of years ago an authority on diet came up with a fascinating chart of "energy equivalents."[3] For example, an 8 oz. glass of beer has 114 calories. It will take 88 minutes to expend the caloric energy in that one glass of beer just lying still. It will take 22 minutes to walk it off at a normal pace. The same calories can be burned up in six minutes by running. A 3 1/2 oz. martini has 140 calories. To burn these calories it takes 108 minutes just lying there, 27 minutes of walking or 7 minutes of running. And how 'bout this: a chocolate ice cream soda has 255 calories. That's 196 minutes worth of reclining, 49 minutes of walking or 13 minutes of running. All this without mentioning it takes nearly a half an hour of running to get rid of the 502 calories in a chocolate malt. But we're getting carried away. Don't jump to the conclusion that we want you to give up chocolate malts for beer because beer has fewer calories or that between drinks you should jog three laps around the club. The point is you can eat or drink any amount of calories you want without putting on weight *if you will burn them up as fast as you take them on.*

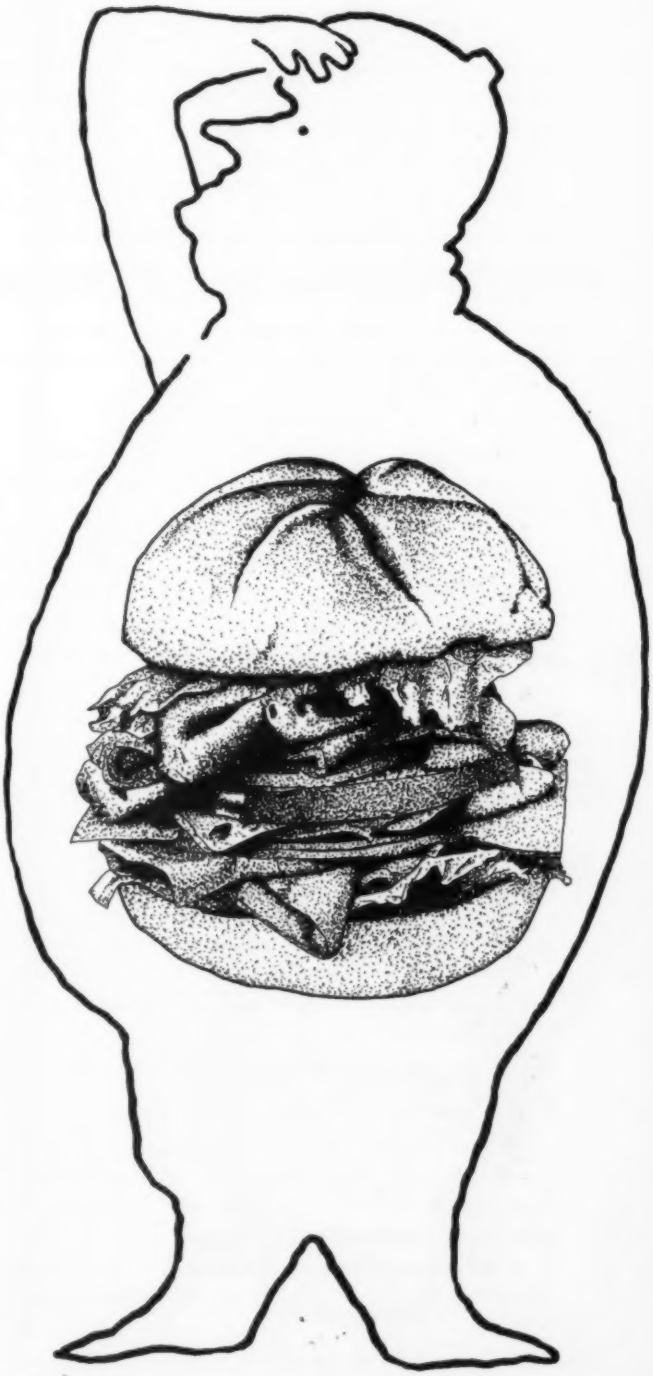
Continued

[2]Metropolitan Life Insurance Co., "Overweight – Its Significance and Prevention."

[3]Konishi, F. J., Journal of American Dietetic Association, 46:187, 1965.

In dieting, every second counts.

Anon.



### Not Enough Exercise

The main cause of overweight is too much food and too little exercise. When you eat more than your body needs, those extra calories go into double chins, spare tires and all kinds of unsightly bulges. Young men in their 20's and 30's are susceptible to rapid weight gain. Medical studies show that these are the strategic years for a man to maintain his best weight, the weight that's correct for his individual frame, muscular development and height. Your flight surgeon can tell you what your best weight is if you don't already know.

As we get older we slow down a bit but our eating habits don't change. Around age 40 or so our energy requirements usually diminish. For instance, maybe you used to go out for football and now you'd rather watch a good NFL game on TV. As you cut down on physical activity you need fewer energy-producing foods. As we said before, extra unburned calories go to fat. It's easier and medically safer to keep weight under control now than to attempt to take off pounds later in life.

### What Can We Do?

Here are some tips to prevent becoming overweight, based on suggestions from one of the country's largest insurance companies:

- Know your desirable weight and keep tabs on it by weighing regularly.
- Start the day right with a good breakfast. Breakfast should supply about one-fourth of your day's food requirements. An adequate breakfast furnishes energy for the morning's work and helps keep you from overeating at lunch.
- Watch those between-meal and late-night snacks. Whenever you do eat high-calorie foods between meals, remember to skip dessert at lunch or dinner.
- Go easy on the extras. Don't take that second pat of butter. Pass up rich gravies, sauces and salad dressings.
- Avoid cream and cream cheese, sugar and other sweets, nuts, and foods prepared with a lot of shortening.
- Eat your meals slowly, allowing time for your blood sugar to rise. This helps to make smaller amounts of food more satisfying.
- Stick to roasted, boiled and broiled foods instead of fried foods.
- Drink your coffee black with no cream or sugar.
- Make it a point to get some exercise every day. Even a short daily walk helps to keep off extra pounds. A reasonable amount of daily exercise is a *must* for maintaining your best weight and muscle tone.
- Steer clear of reducing drugs and blitz diets. There are no safe shortcuts or miracle methods for healthfully taking off weight and for aviation personnel, drugs and diets can be a hazard to safe flight.

Remember, too, that *OpNavInst 3710.7D, General NATOPS*, states reducing diets "shall be under the strict supervision of the flight surgeon."

- By establishing healthful eating patterns you can keep yourself at your best weight for life.

The only way to lose weight is to eat less food and expend more energy. Your goal should be weight-control – not a zigzag between losing and gaining. To lose is to win. You'll feel better . . . you'll look better . . . you'll pass your annual flight physical and you'll probably live longer. That's a pretty good deal!

*In a future issue we will address the subject of physical fitness and exercise. – Ed.*

Taking on calories? Burn them up!

# The Maintenance Officer

as seen by

the Commanding Officer

the Supply Officer

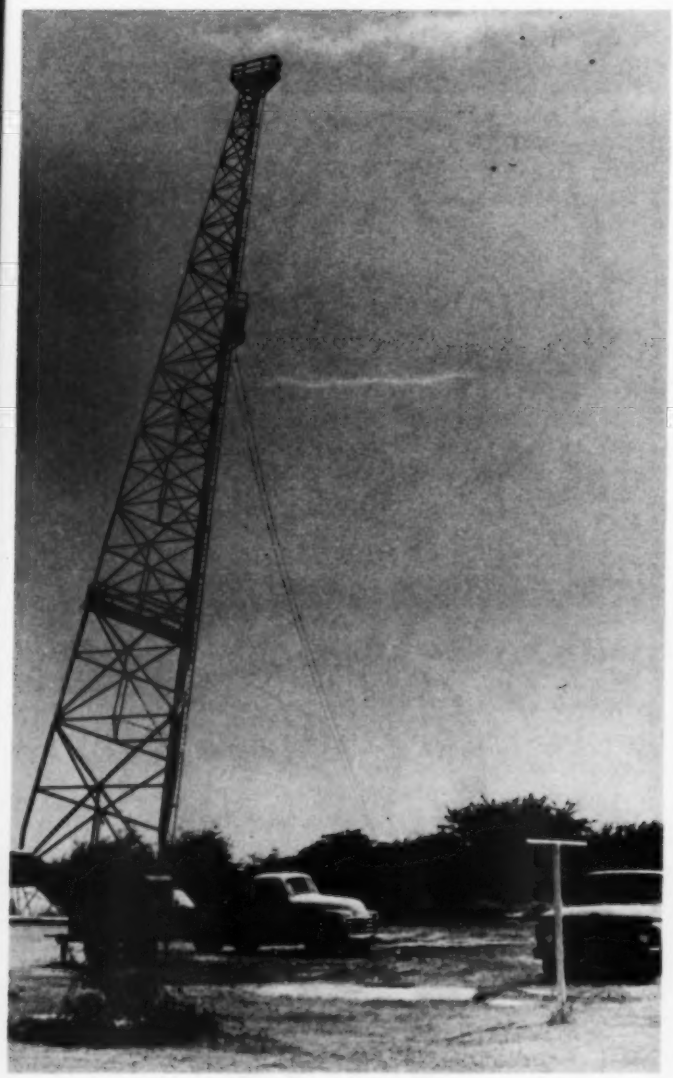
himself

his men

his wife

# Eliminating Airfield Obstructions

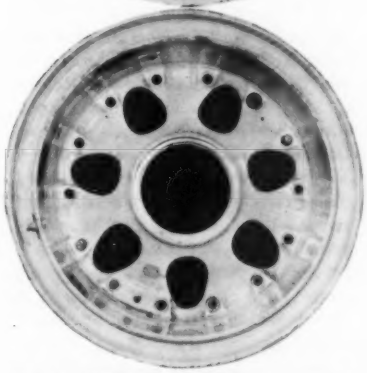
By CDR William D. Middleton, CEC



Communication consolidation with NavComSta Honolulu permitted removal of communication towers located within the field boundary.

# MURPHY'S LAW *

INCORRECT



CORRECT



## P-3 Wheel Mismatch

THE following situation was discovered before it led to a major accident and lost lives or equipment.

The MLG wheel halves on a P-3B were found to have been improperly assembled. The spokes in each wheel half had not been aligned during buildup (in accordance with NavAir 01-75PAA-2-2.2, section 4, paragraph 116, items G and H). This led the squadron to check the wheel assemblies on other aircraft, plus all spares, with the following results: 12 misaligned wheel assemblies out of 29.

Misalignment of wheel halves can be a factor causing overheating of assemblies during braking. Additionally, such misalignment can contribute to decreased wheel strength. Close attention by all hands involved in the assembly of these units and closer monitoring by Quality Assurance personnel at both intermediate and organizational levels should reduce recurrence of this discrepancy to ZERO *(where it belongs).* ◄

* If an aircraft part can be installed incorrectly, someone will install it that way!

# LETTERS

If you cheat on a diet, you gain in the end.
Anon.

## Flotation Gear For Helo Crews

*FPO, New York* – If memory serves me right, back in the 1960's it was established that wearing the "back pack" PR-2 (now LR-1) liferaft in flight could be a dangerous business. Accidental inflation could cause undue pressure on the pilot with such severity as to create breathing difficulties. Releasing the lap belt would allow the pilot and liferaft to be forced forward in the cockpit and into the controls, which is a hazard all its own. I remember that all of the helicopters that PR-2s were used in had a special metal "toad stabber" in the cockpit so the pilot could puncture the liferaft in case of accidental inflation.

What's the present policy on the LR-1 liferaft? Do we wear it or just keep it handy in the helo in case its use is required?

Secondly, what's the latest on the H-3 drivers wearing the Mk-3C life preserver? We are presently wearing the regular old Mk-2 "mae west" but several pilots, including myself, would prefer to wear the Mk-3C. Our survival equipment experts in the squadron tell us that it's not allowed because accidental inflation could prevent emergency egress from the aircraft. Can we use the Mk-3C as an interim measure until the LPA-1 is available?

LCDR J. L. Meiling, USN
ASO HS-11

**● Present policy on the LR-1 liferaft as stated in the Inflatable Survival Equipment Manual (Navair 13-1-6.1) is that the LR-1 back pad assembly will be used in all helos. The LR-1 has a quick release incorporated in case of hang-up. *Do not* hook up the lanyard to the vest. The bottom of the back rest must be cut to accommodate the LR-1 assembly. The Safety Center helo analyst says don't just keep it handy – wear it!**

**The very latest word from Aerospace Crew Equipment Department (ACED) on use of the Mk-3C life preserver by H-3 drivers is that it is OK providing a properly modified SV-2A survival vest is also worn. At present this is in conflict with the Inflatable Survival Equipment Manual (NavAir 13-1-6.1) but a representative of ACED advises that this conflict will be resolved.**

**The Section H Allowance List (NavAir 00-35QH-2) states that the Mk-3C is allowed on the basis of 110 percent of pilot and non-pilot crewmembers. On the other hand, NavAir 13-1-6.1 states that the Mk-3C is not applicable to helicopters. However, now that the SV-2A survival vest can be used as an attachment point for the Mk-3C, the picture has changed. NavAirSysCom (Naval Air Systems Command) will change NavAir 13-1-6.1 to state that wherever the LPA-1 life preserver is authorized, the Mk-3C life preserver can be used as a substitute, providing, as we said above, that a properly modified SV-2A survival vest is worn and providing the Mk-3C is compatible with the parachute carried (where required).**

## Pen Holder

*MCAS New River* – The pen holder on the left arm of the nomex flight suit is a potential safety hazard. A government-issue pen slipped out of my flight suit during a recent OV-10 flight and disappeared into the nether regions of the cockpit. Result: loose article hazard.

My flight safety officer has pointed out that pens or other sharp objects stowed in the arm holders are also a potential source of injury during ejection.

I suggest two methods of correction:

As an interim measure, make it SOP to stow pens in the zip pocket on the left arm. Although inconvenient, it is at least more secure.

A more permanent solution might be to introduce a spring-clip pen holder which the Royal Navy has sewn into flight suits. This clip grips the barrel of the pen and provides much more security than the standard metal clip found on most pens and pencils.

CAPT C. J. B. Campbell
Royal Marines, VMO-1

**● Thank you for your suggestions. We will pass them along to the folks who design our flight suits.**

## OV-10 Cover

*Camp Lejeune, N.C.* – I enjoyed Mr. Ron Ferguson's picture of the OV-10s on the front and back cover of your August 1969 issue. However, stark terror struck at my heart when I noticed the rear seat occupant of aircraft No. 10 complacently observing his surroundings *with his visor up!* The visor being in the up position is easily noticed and upon closer examination, further substantiated by the visor slide lock being up. I strongly recommend the dual visor modification!

As an aerial observer, I have been instructed that the visor is to be in the down and locked position from the time the safety pin is pulled on the LW-3B ejection seat until the pin is reinserted upon completion of the flight as the aircraft returns to the line. The reasons stated to me (and they do make sense) are: 1) In case of canopy failure (which has happened on one occasion and definitely surprised the pilot and observer); and 2) Ejection is through the overhead canopy; thus it is possible for injury to be sustained while exiting the aircraft.

My apologies for the late submission of this comment. I have a hell of a time acquiring a copy of APPROACH since I am primarily an artillery officer and thus

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**Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.**

attached to an Artillery Unit and can only get hold of your fine publication every now and then. However, I feel safety comments are never too late if they prove beneficial.

CAPT James R. Thomas, USMC
Chief Aerial Observer
10th Marine Regiment
2nd Marine Division, FMFLANT

**• Pretty good aerial observation on your part, we'd say! You couldn't be more correct. Visors are like automobile seat belts – not very necessary until they're needed – and then they're the greatest thing since sliced bread! Thanks for your letter and we agree that it's never too late for safety comments.**

## Squeaky Clean

*NAS Anywhere* – It was raining steadily as I stepped out of the van and ducked under the wing. Planning my moves so that I could expedite my preflight and get into the cockpit while absorbing a minimum amount of heavenly dew, I started around the aircraft at a fast walk. As I finished, the plane captain opened the canopy and, after a quick look at the seat, I scrambled in. I grabbed my hard-hat bag and closed the canopy immediately. As a result of the rain, the humidity and my body heat (which had increased from hurrying), water was running down over my eyes and off my face. I was still wearing my nomex gloves as I proceeded to wipe my head and face.

Fortunately the overhead rear view mirror was positioned just right and I saw two large streaks of greasy dirt on my face. I then realized my gloves, which had been used for many preflights, had accumulated their share of dirt and grease. Even after wiping my face clean, I was still a bit concerned and hesitant when I checked my oxygen mask.

The good "wearability" of the nomex gloves makes me reluctant to trade them in when soiled. From now on they will get a machine washing frequently.

Streaked Mouse

**• Dirty, greasy gloves are a fire hazard instead of a fire protection. Air Crew Systems Bulletin 152 tells you exactly how to wash nomex gloves. It's good that you discovered the grease before it could cause trouble.**

Due to a printing error, credit for last month's cover was omitted. The June cover painting by John J. Carr was provided courtesy of Bell Aerospace Company, Division of Textron, and shows the moment of truth in carrier aviation – the carrier landing.

## Flight Suit

*MCAS Yuma* – On 2 May 1970 at NAS Memphis I saw an aviator preflighting an A-4. This pilot was dressed in a brown shiny flight suit that came halfway up his calves. Is this some new suit or the old kind of nut that's been around too long? Nomex is far safer!

LT P. F. Macon, MC, USNR
MCCRTG-10

**• The only thing we can think of is that you may have seen one of the original PBI (polybenzimidazole) suits. PBI, a highly flame-resistant material, is brown and shiny but we're stumped by the knickers!**

**The Navy is in the process of getting 50 PBI suits for evaluation (regular flight suit style).**


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NavWeps 00-75-510

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**Distribution:** Requests for distribution changes should be directed to NavSafeCen, NAS, Norfolk, Va. 23511. Phone: Area Code 703, 444-1321, Att: Safety Education Dept., IF YOU ARE A PAID SUBSCRIBER, address all renewals and address changes to Division of Public Documents, Washington, D. C. 20402.

**Subscriptions:** Single copy 60 cents; 1-year subscriptions $7.00; $1.75 additional annually for foreign mailing.

**Printing:** Issuance of this periodical approved in accordance with Department of the Navy Publications and Printing Regulations, NAVEXOS P-35. Library of Congress Catalog No. 57 60020.



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## Credits

This month's cover painting by staff artist Blake Rader evokes the spirit of patriotism evinced by Naval Aviators in times of crisis. **Pg 10-13** Diagrams by Don Lips courtesy the author. **Pg 12-13** Photos courtesy Naval Weapons Center, China Lake, Calif.

FOD is dirty.

Grease is dirty.

Complacency is dirty.

Murphy's Law is dirty.

Corrosion is dirty.

Litter is dirty.

Fire is dirty.

Sloppy maintenance is dirty.

Reckless driving is dirty.

Obesity is dirty.

# Fight Dirty!

NAVY
readiness
through
safety